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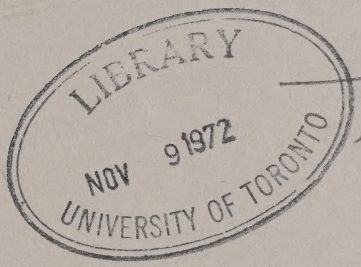

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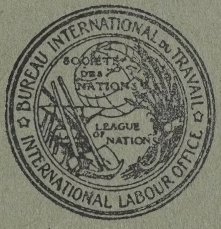
METHODS OF STATISTICS

OF

INDUSTRIAL ACCIDENTS

Report prepared for the International Conference of Labour Statisticians (29 October to 2 November 1923)



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PRELIMINARY NOTE

An International Conference of Labour Statisticians was held under the auspices of the International Labour Organisation at Geneva from 29 October to 2 November 1923 for the purpose of discussing the principles and methods upon which certain branches of labour statistics should be drawn up from the point of view of international comparisons.

The agenda, which was determined by the Governing Body of the International Labour Office, consisted of the following three subjects:

(*a*) The classification of industries and occupations for the purpose of labour statistics.

(*b*) The statistics of wages and hours of labour.

(*c*) The statistics of industrial accidents.

A report on each of these subjects was prepared by the Statistical Section of the International Labour Office and circulated in advance to the Governments, together with certain draft resolutions which were submitted as a basis for discussion. These reports, though prepared primarily for the Conference, are in effect self-contained and independent studies of the different subjects and many problems are treated which were not discussed at the Conference. It has therefore been decided to publish the Reports separately from the account of the proceedings of the Conference. The present report is as submitted to the Conference of Labour Statisticians, with the exception of minor modifications in statements of facts.

The draft resolutions submitted to the Conference, together with a résumé of the discussions and the definitive resolutions adopted, will be found in the General Report of the Conference [1] which is issued simultaneously with this report.

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[1] INTERNATIONAL LABOUR OFFICE: *International Conference of Labour Statisticians*. Report on the International Conference of Representatives of Labour Statistical Departments, held at Geneva, 29 October to 2 November 1923. Studies and Reports, Series N (Statistics) No. 4. Geneva, 1923.

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CHAPTER I

Objects of Statistics of Industrial Accidents

All workers are exposed in a greater or lesser degree to the risk of injury by accidents arising out of, or in the course of, their employment and the large number of workers who, year by year, are killed or injured by means of industrial accidents form a regular feature of industry in all countries. Hence, almost every industrial State has accepted the responsibility of dealing with industrial accidents by ensuring that the worker, or the workers' dependents, are compensated for the loss sustained during the period of incapacity, and also by seeing that the possiblity of accidents is reduced to a minimum. The former is attained by workmen's compensation and accident insurance legislation, the latter by Factory Inspection, Mines Inspection and Regulations, and by educational work among employers and workers such as the "Safety First" movement. The objects of statistics of industrial accident are therefore twofold:

(1) to provide information as to nature and causes of industrial accidents, so that steps may be taken to prevent their occurrence;
(2) to provide a measure of the accident risk, so that insurance and compensation schemes might be drafted on sound lines.

Before discussing the statistics of industrial accidents it is necessary at the outset to consider what is meant by an "industrial accident". The liability of compensation for accidents rests generally on the employer, the undertaking or groups of undertakings, and it is necessary, in order to insure against this risk, to know how accidents vary in different industries, and hence a classification by industries is essential. Both for assessing adequate compensation and for restoring the workers' capacity it is desirable to know the nature and extent of the injury, and statistics of industrial accidents should therefore give a classification

by location and nature of injury and a classification by extent of disability. For accident prevention work it is essential to know not only the nature and degree of injury but also why the accident happened, for which statistics by causes are required. Finally, it is necessary to know the risk of accidents in different industries and classes of workers, and at different times; hence frequency rates and severity rates.

Many other analyses of industrial accidents are desirable for particular purposes, for example analyses by sex or by degree of skill of the worker, by hour of the day, or by day of the week, but these are of minor importance.

The following sections therefore deal briefly with the necessary data as outlined above, viz.:

(1) Definition of industrial accident.
(2) Classification of accidents by industries.
(3) Classification of accidents by causes.
(4) Classification of accidents by location and nature of injury.
(5) Classification by extent of disability.
(6) Definition of "accident exposure" and "accident rates".

Definition of Industrial Accident

It is impossible to give a definition of industrial accident which is of universal acceptance. Unlike other branches of labour statistics, such as those of wages, strikes, unemployment, statistics of industrial accidents arise entirely as a result of the accident legislation in force in different countries and each country defines industrial accidents in a different manner. In some countries, for example, legislation covers all industries, in other countries only certain specified industries. In some countries legislation varies according to the size of the establishment or other factors. The term "accident" as generally used nowadays in this connection implies a sudden, unexpected, external event which results in some injury, defect, or incapacity, and an "industrial" accident is one which happens by reason of the contractual relationship between employer and employed. It must therefore be connected in some way with employment. Here, however, the legislation, and especially its interpretation in the law courts, differs in every country. In some countries, for example, the accident must arise "out of the employment" or "in the course of employment" or

"out of *and* in the course of" employment, and in some countries accidents happening on the way to and from work are included. A further difference arises in the degree of severity of accident. An industrial accident may range from a slight cut causing incapacity for a few minutes, up to death, and obviously no country provides for the reporting or compensating of all the minor classes of accidents.

These difficulties in the legislation and administrative practices of the different countries prevent any attempt being made to define an industrial accident. Accident statistics do not deal with all industrial accidents but only with two important classes, viz. accidents which are notifiable to the competent authority, and accidents which are compensable according to the accident insurance or compensation legislation. As this report is concerned solely with the statistics of industrial accidents and not with a comparison of the various compensation and accident systems, it is not necessary to set out these differences(1). Our purpose is rather to accept the existing accident legislation and discuss the various classes of statistics arising therefrom, how they can be developed, and whether any suggestions can be made for improving them from an international point of view.

Classification by Industries

The accident risk varies according to the *milieu* out of which it arises, and therefore any statistics of industrial accidents should show a classification by industries or by industrial establishments. As accidents arise in an establishment, are reported by establishments, and compensated by the owner of the establishment or by a fund made up of contributions from employers according to the risk, it is essential that the establishment should be taken as the unit of classification (2). As a separate report on the classification of industries and occupations for labour statistics has been prepared(3), it is not necessary to deal with the subject in detail here except to state that a more detailed classification is often neces-

(1) A résumé of the accident legislation in certain countries is given in Appendix I.

(2) Similarly, the necessity of taking measures with regard to the prevention of accidents requires that the statistics should be based on the industrial undertakings.

(3) See International Labour Office: *Report on Systems of Classification of Industries and Occupations.* Studies and Reports, Series N (Statistics) No. 1. Geneva, 1923.

sary for the purpose of industrial accident statistics than for other statistics such as, for example, unemployment. The group "transport" covers such various groups as navigation, docks, railway and postal service in which the accident risk varies considerably, and a group such as this is too comprehensive for the purpose of industrial accident statistics. Thus, though the general principles of an industrial classification might be adopted, allowance would have to be made for special cases and further sub-divisions, according to the varying risks of accidents.

In most countries industries are classed according to the products of the establishment, but in the case of "mixed establishments", *i.e.* establishments engaged in different (though usually related) branches of industry, the statistics are not always separately referred to the different branches. In Belgium and Austria for example, this has been carried out with thoroughness. In Austria, Netherlands, and Norway a classification specially for the purpose of industrial accident statistics is laid down by law which prescribes that industries subject to the law shall be divided, by regulation, into classes of risk, the technical character of the work being taken into consideration. In Germany the statistics are based on trade associations *(Berufsgenossenschaften)* which are organised on industrial lines. Under these associations the establishments are subdivided according to raw material and products. A special feature is formed by the "subsidiary undertakings" *(Nebenbetriebe)* which are given separately for many industries. Industries are also classed in some countries into those using motive power and those not.

Classification by Causes

In classifying accidents by causes, it is necessary to know what is meant by "cause". Theoretically every accident is the outcome of a long train of events and can be traced to some remote cause which in many cases is the failure in some way of some human being. It is not sufficient to say that the cause of an accident is, for example, the falling of a tower. Why did the tower fall ? Perhaps because the strength of the materials were miscalculated by the builder, or the specifications were not carried out by the contractor, or the work was negligently done by a worker. If the latter, we can again ask why the worker neglected his task. It

may have been because he was tired, or overfatigued, or insufficiently trained. And so the questions as to the cause can be carried farther and farther back. The question of causation has been looked at from two points of view: the moral or subjective cause, and the material or objective cause.

In the German decennial statistics greater value than in others seems to have been attributed to the classification of accidents by moral causes or by responsibility for the occurrence of accidents. The following extract from these statistics will give an idea of the classification concerned:

Responsibility for Industrial Accidents in Germany in per cents.

	1897	1907
Fault of the employer	16.81	12.06
Fault of employee	29.89	41.26
Common fault of employer and employee	4.66	0.90
Fault of fellow workers and other persons	5.28	5.94
General hazard not involving fault	42.05	37.65
Contingencies, etc.	1.31	2.19
Total	100.00	100.00

It will be seen that a fault has been established in about 60 per cent. of the cases. It is very noticeable that the accidents imputed to workers' fault have increased from 30 to 40 per cent. in ten years. In most cases the workers' fault is given as "lack of skill," "inattention," or "carelessness". No fault was discoverable in about 40 per cent. of cases, and these groups simply indicate that either responsibility and moral cause is unknown or the accidents were considered at that time unpreventable. It is, however, stated in the introduction to the above statistics that the "fault" is in the great majority of cases very slight, so that it is difficult to draw a real frontier between "preventable" and "unpreventable" accidents.

In Norway, on the other hand, a classification of moral causation showed the following results for the three-year period 1904-1906:

Responsibility for Industrial Accidents in Norway.

Fault of the injured	452
Fault of the employer	104
Fault of third person	71
Contingencies	6,364
Total	6,991

As will be seen from these figures only a trifling number of accidents are attributed to anybody's fault. The conclusion cannot

be avoided that little scientific value can be attached to enquiries of this kind. In the more recent accident statistics the classifications respecting fault have practically disappeared.

In practice, the immediate objective cause which is, as a rule, a material or mechanical event, is taken as the basis of classification. A characteristic common to all countries is that of separating accidents caused by machinery, since machinery accidents are one of the largest groups of causes (accounting for about one-fourth of all accidents in most countries) and since also the causes in these cases are more easily determined. They also receive special attention as they lend themselves especially to "prevention work".

Machinery accidents may be further analysed under "type of machine," "manner of occurrence," or "part of machine on which the accident occurred". The first is of course the most important and is given for most countries, but a correct classification requires a great technical knowledge of modern machinery. As regards classification by manner of occurrence, for example, the starting, stopping, adjusting, or breaking of a machine, only a few countries have attempted it (e. g. Finland, Sweden, and certain American states). The "parts of a machine," for example, fly wheel, gears, driving mechanism, are only given by a few American states (e. g. California and Massachusetts).

Generally, European states have contented themselves with rather summary general classifications of causes comprising from 12 to 20 headings on the average (Austria and Germany, however, give 62 and 69 respectively). Some of the American states present extremely detailed classifications of 300 to 350 groups.

Table I shows the distribution (in per cent.) of accidents, classified by causes for a certain number of countries. The figures for Austria, the Netherlands, and Norway are taken from a table published in the *Bulletin des Assurances sociales* (1), and statistics for Belgium, California, France, Germany, Massachusetts, and Sweden have been calculated from original sources.

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(1) *Bulletin des Assurances sociales*, No. 5, 1913, p. 17*.

TABLE I. — DISTRIBUTION OF ACCIDENTS BY CAUSES IN VARIOUS COUNTRIES, IN PER CENT (1)

Causes of accidents	Austria	Belgium	France	Germany	Netherlands	Norway	Sweden	United States	
								California	Massachusetts
Machinery	(22.6)	(7.2)	(7.2)	23.1	9.1	17.7	20.4	10.7	27.0
Prime movers	0.6	0.5	0.2	—	0.5	0.1	0.3	0.3	—
Transmissions	1.3	1.7	0.6	—	0.7	1.5	1.0	1.1	—
Working machines	20.7	5.0	6.4	—	7.9	16.2	19.1	9.3	—
Hoisting apparatus, cranes	1.8	0.6	0.6	5.9	3.2	3.0	2.8	1.1	—
Boilers, steam pressure, explosions	0.2	0.4	0.1	0.5	0.1	0.2	0.2	1.0	
Furnaces, flames, conflagrations	—		—	—	0.4	—	—	4.6	4.4
Explosive substances	0.7	—	0.1	2.1	0.1	2.0	0.3		
Hot and corrosive substances	4.7	4.8	5.5	4.0	8.6	2.7	4.0		
Collapse, fall and handling of objects	14.7	(35.4)	29.4	15.0	11.0	(13.5)	6.4	(33.4)	(29.1)
Fall of ballast, etc.	—	—	—	—	—	2.3	—		
Falling in, etc.	—	0.2	—	—	—	11.2	—		
Collapse of piles, pieces of wall, etc.	—	5.9	—	—	0.8	—	—	8.1	3.6
Chutes, falling objects, etc.	—	13.4	—	—	10.2	—	—		
Handling of objects	—	15.9	—	—	—	—	—	25.3	25.5
Falls of persons	13.5	18.3	18.5	11.6	17.0	21.1	8.2	13.4	12.7
Loading and unloading by hand	15.3	10.2	14.7	9.7	14.5	12.2	19.0	—	—
Vehicles and animals	(12.6)	10.9	5.7	(15.5)	(6.2)	(3.8)	(11.7)	(11.9)	(7.4)
Animals	—	2.2	—	1.1	0.6	—	1.1	2.1	0.7
Animal-drawn vehicles	4.6	1.9	—		—	3.8	4.1		
Funiculars, vehicles on rails, etc.	—	—	—	4.0	—	—	5.8		
Crushing by vehicles	—	—	—		1.1	—	—		
Automobiles, bicycles, etc.	—	0.01	—		3.1	—	0.3	9.8	6.7
Railways	7.9	0.9	—	9.8	0.8	—	—		
Metalled and stoned roads		5.9	—	—	—	—	—		
Navigation	0.1	—	—	0.6	0.6	—	0.4		
Hand tools	7.8	7.4	6.6	4.0	12.0	5.0	15.6	9.4	8.0
Miscellaneous	6.1	4.8	11.3	(8.6)	17.8	18.8	11.4	14.5	(11.4)
Electricity	—	0.1	0.2	0.7	0.6	—	0.3	0.6	0.6
Flying chips, splinters, etc.	—	4.2	—	—	3.3	—	—	—	—
Compressed air, gas, etc.	—	0.2	0.06	—	—	—	0.1	—	—
Blows, thrusts, etc.	—	—	—	—	—	—	—	—	—
Stepping on objects	—	—	—	—	—	—	0.9	8.2	5.0
Other causes	—	0.3	11.0	7.9	13.9	5.5	10.1	5.7	5.8
Unknown causes	—	—	0.3	—	—	—	—	—	—

(1) AUSTRIA: annual statistics of 1909, accidents disabling for over 28 days. BELGIUM: quinquennial statistics of 1906, accidents disabling for more than a week. FRANCE: factory accident statistics of 1913, accidents disabling for more than 4 days. GERMANY: annual statistics of 1920, accidents disabling for more than 91 days (agricultural accidents excluded). NETHERLANDS: statistics of 1906, accidents disabling for more than 2 days. NORWAY: statistics of 1904-1906, accidents disabling for more than 28 days. SWEDEN: statistics of 1919, accidents disabling for more than 3 days. CALIFORNIA: statistics of financial year 1920-1921, all "tabulatable" accidents. MASSACHUSETTS: statistics of financial year 1918-1919, all "tabulatable" accidents.

It should be noted that, while some of the figures refer to total (reportable) accidents, some others refer only to severe (compensable) ones. In general, it will be seen that almost all the classifications have adopted the following separate groups of causes:

Machinery (with three sub-groups).
Hoisting machinery.
Steam boilers and pressure.
Fires, explosives, and hot substances.
Falls of objects.
Falls of persons.
Loading and unloading by hand.
Vehicles.
Hand tools.

This classification is not, however, a logical one. In some cases it is the "process" which is taken as cause (machinery, steam boilers, loading and unloading); in others it is some event itself (fires, falls of objects). Sometimes the heading covers both of these and other bases too (e. g. vehicles). On first sight the classification of the machine accidents appears to be rather uniform in the various statistics. Much less satisfactory is the grouping of the non-machine accidents, the relative importance of which ranges in the table from 73 to 93 per cent. of all accidents. For instance, division of "collapses and falls" as well as of "vehicles" are very varying and immature, and such an important group of causes as "handling of objects" is distinguished only exceptionally. The miscellaneous group includes extremely different items, in some cases certain specific causes, e. g. electric currents, which in other cases are classified under some of the general groups.

Apart from differences in the nomenclature, the practice of assigning accidents due to certain causes appears to be very varying. While, for instance, only about 7 per cent. of accidents in Belgium and France are described as machine accidents, the same group in a less industrialised country, Sweden, numbers over 20 per cent.; or, while more than 35 per cent. of accidents (disabling for more than a week) in Belgium are due to collapsing, falling in, and handling of objects, the corresponding percentage for the Netherlands is only about 11, etc. It is thus probable that not only the composition of the industry groups is very different in the different statistics, but that also different criteria are observed in the various statistics as to the stage of event which is considered as the final cause of the accident.

Classification by Location and Nature of Injury

The classification of accidents according to their location and nature of injury are primarily medical and not statistical problems. The two aspects of the question, however, should not be confused as it often done. Classification of accidents by location refers solely to the different parts of the body which have been injured, whereas classification by nature refers to the kind of injury irrespective of the part of body affected — for example burns, fractures, dislocation, concussions, cuts, poisons, etc. In dealing with the location of injury the most convenient method of classification for accident statistics is to follow the common anatomical divisions of the body.

In the majority of existing accident statistics, a mixed classification of location and nature is given, while some, *e.g.* the Swedish statistics, only give a classification of location, and others, *e.g.* the French and British compensation and factory statistics, do not give this classification at all. Classification both by location and by nature are only found in two European countries and the United States. In the latter country these classifications have been considerably developed. In order to give some idea of existing classifications tables II, III, and IV give respectively instances of the mixed classification as generally used, of the classification by location, and of the classification by nature of injury. These tables give sufficient evidence of the considerable confusion existing at present.

The mixed classifications distinguish in general by parts of the body only a certain group of injuries, while other groups of injuries such as bruises, strains, etc., and fatal injuries are given as separate groups without a location classification. Further, the differences in the number of classes entered in the list varies enormously. Even in a simple group, such, for example, as arm, hand, and fingers, all possible combinations of these parts might occur, and sometimes the principal part of the body affected only is given.

TABLE II. — MIXED CLASSIFICATIONS OF LOCATION AND NATURE OF INJURY IN VARIOUS COUNTRIES (1)

(Percentage of all Injuries)

Location and nature of injury	Austria	Belgium	Finland	Germany	Netherlands
Wounds, fractures, etc.					
Head and neck (exc. eyes)	4.2	2.8	3.8	7.18	3.9
Eyes	5.6	4.0	4.2	4.93	4.3
Shoulders	—	2.5	2.1	—	—
Arms and hands	—	—	54.6	32.41	—
Do. except fingers	13.8	19.7	—	—	21.2
Fingers	30.2	23.3	—	—	29.4
Legs and feet	26.4	—	17.2	26.02	—
Do. except toes	—	28.7	—	—	25.3
Toes	—	3.1	—	—	4.5
Trunk	—	9.2	2.3	11.30	—
Hernia	—	0.3	1.1	0.28	—
Other locations, or more than one location	17.1	3.3	—	—	10.3
More than one location	—	—	0.2	10.02	—
Body as a whole	—	—	—	1.69	—
Internal injuries	2.4	0.2	1.6	—	0.4
Nerves	—	0.07	—	—	0.06
Burns (except of eyes)	—	—	4.4	2.34	—
Do. of eyes	—	—	—	0.55	—
Fatal injuries					
Asphyxiation	0.15	0.03	2.5	3.01	0.01
Drowning	0.01	0.02		0.06	0.11
Other injuries	—	—		0.11	0.04
Miscellaneous non-fatal	0.12	2.8	5.4	0.10	0.37
Unknown	—	—	0.6	—	—

(1) The list of injuries is based on the table given in the *Bulletin des Assurances sociales*, 1913, No. 5, p. 14. AUSTRIA: quinquennial statistics of 1904, accidents disabling for more than 28 days. BELGIUM: quinquennial statistics of 1906, accidents disabling for at least 87 days. FINLAND: annual statistics of 1917, accidents disabling for more than 6 days. GERMANY: decennial industrial accident statistics of 1907, accidents disabling for more than 91 days. NETHERLANDS: statistics of 1906, accidents disabling for more than 2 days.

TABLE III. — CLASSIFICATIONS OF LOCATION OF INJURY IN VARIOUS COUNTRIES (1)

(Percentage of all Injuries)

Location of injury	Italy	Norway	Spain	Sweden	United States	
					California	Massachusetts
Head	0.3	3.7	11.2	—	9.9	10.6
Head, except eyes	4.9	—	—	1.7	—	—
Eyes	5.0	8.9	—	19.6	—	—
Face and neck	—	—	—	—	3.3	3.6
Neck	0.2	—	—	—	—	—
Trunk	12.8	11.7	8.7	—	14.2	10.9
Abdomen, loins, and pelvis	—	—	—	0.3	—	—
Internal thoracic and abdominal organs	—	—	—	1.2	—	—
Neck, chest, and back	—	—	—	0.6	—	—
Upper extremities	—	—	41.9	—	42.2	49.0
Shoulder joint and arms	—	—	—	6.7	—	—
Arms and hands	46.0	—	—	—	—	—
Do. except fingers	—	13.5	—	—	—	—
Hands	—	—	—	2.8	—	—
Fingers	—	25.5	—	37.6	—	—
Lower extremities	—	—	22.7	—	28.3	24.3
Hip joints and legs	—	—	—	11.2	—	—
Legs and feet	25.2	26.4	—	—	—	—
Feet and toes	—	—	—	3.2	—	—
General	—	—	2.0	—	2.1	1.6
Body as a whole	0.1	1.2	—	0.2	—	—
More than one location	5.3	—	—	14.0	—	—
Hernia	—	9.1	—	0.0	—	—
Nerves	—	—	—	0.2	—	—
Miscellaneous	—	—	—	0.7	—	—
Unprecise	0.2	—	13.0	—	—	—

(1) The six chief groups in the list of injuries are as used in the American classifications, and the other items are selected so as to give the most important groups for the various series. ITALY: special statistics of 1903, accidents disabling for more than 5 days. NORWAY: statistics of 1904 to 1906, accidents disabling for more than 28 days. SPAIN: statistics for first half of 1922, accidents disabling for one or more days. SWEDEN: annual statistics of 1918, cases of permanent disability. CALIFORNIA: statistics of 1920–1921, tabulatable accidents other than deaths. MASSACHUSETTS: statistics of 1918-1919, tabulatable accidents. The American sub-division of injuries by their location is too detailed for this table, and therefore the chief groups only have been given in the two last columns.

TABLE IV. — CLASSIFICATIONS OF NATURE OF INJURY IN VARIOUS COUNTRIES (1)

(Percentage of all Injuries)

Nature of injury	Hungary	Italy	Norway	United States	
				California	Massachusetts
Abrasions, contusions, bruises	48.1	49.4	32.7	25.5	26.7
Burns, scalds	6.0	7.05	3.3	4.5	5.6
Cuts, punctures, lacerations	16.5	25.5	29.3	28.7	32.3
Concussions	—	10.8	5.2	—	0.1
Dislocations	—			0.8	0.6
Fractures	5.5	4.3	16.3	10.9	6.3
Sprains and strains	—	—	—	17.0	13.3
Amputations	—	—	—	1.8	2.9
Shocks	—	—	—	—	0.1
Stiffness, contraction	—	—	—	1.3	—
Asphyxiation, drowning	0.2	—	0.7	—	—
Hernia	—	—	0.14	—	—
Tearing off internal organs	—	—	3.05	—	—
Poisoning	0.1	—	—	—	—
Occupational diseases	—	—	—	0.9	0.9
All other, not specified	19.8	2.7	9.3	8.6	11.2
Unknown	3.8	0.2	—	—	—

(1) The list of the nature of injuries is mainly derived from the American classification, adding such items as are particular for the existing European classifications. HUNGARY: statistics of 1908, reported accidents. ITALY: special statistics of 1903, accidents disabling for more than 5 days. NORWAY: statistics of 1904 to 1906, accidents disabling for more than 28 days. CALIFORNIA: statistics of 1920–1921, tabulatable accidents. MASSACHUSETTS: statistics of 1918-1919, tabulatable accidents.

Classification by Extent and Degree of Disability

Statistics on the degree and extent of disability of accidents are of value chiefly for the following purposes:

(1) for calculating the amount of compensation or pension to be paid to the injured worker or his dependents;
(2) for estimating the actual loss in working days due to accidents.

The first distinction is obviously the one into fatal and non-fatal accidents. Non-fatal accidents, however, may be permanent or temporary, that is, the worker may be incapacitated for life or only incapacitated for a certain period, after which he is able to resume his normal work. Permanent incapacity may be again classified into total or partial, that is, the injured worker may be totally incapable of work for life or he may still be capable of some work though permanently unfit to resume his normal occupation. Temporary disabilities might also be divided into total and partial, but this is a refinement not yet carried out.

The difficulties in establishing these terms are many. There is even a difficulty in distinguishing fatal from non-fatal, since non-fatal accidents resulting in death some time after the occurrence of the accident are not identically treated in different countries. In some countries these cases are included, as far as possible, among fatal accidents, but it is obvious that, as time elapses, it is more and more difficult to say whether the death of a worker is directly due to an accident or not (1). The difficulty in the other groups is that it is impossible to state in many cases at the time of the accident whether the results are likely to be permanent or temporary, or total or partial, and what is apparently at first sight a temporary partial disability may possibly result in complete recovery or in death. In some countries all disabilities are regarded as temporary until a final revision takes place one or more years after the end of medical treatment, while in some countries all injured persons who have not recovered at the end of the year under review are referred to the permanent group. The "probable" result of an accident is estimated in most countries after the termination of the medical treatment. These estimates are generally verified after the lapse of a certain time which varies from one year after the occurrence of the accident in Denmark and Finland, to three years in Belgium, France, Netherlands, and Sweden, and even four years in Germany. In some cases, however, the date of final determination is left unspecified and depends on the individual cases, that is, when the state of the injured worker seems to be sufficiently settled for an approximate determination of the extent of the disability to be made (2).

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(1) It will be interesting to note in this connection that the National Accident Insurance Fund of Italy, in its scheme of industrial accident statistics, proposes the following classification of fatal accidents:

1. Immediate death due exclusively to the accident;
2. Death after the accident and due to the accident, including possible complications;
3. Immediate death due to the accident and pre-existent pathologic condition of the victim;
4. Death after the accident and caused as under (3);
5. Death due to the accident and subsequent pathologic condition independent of the accident;
6. Death due to causes independent of the accident itself.

(Cassa Nazionale d'Assicurazione per gl'infortuni sul lavoro: *Schema di statistica degli infortuni sul lavoro*, p. 146, Roma, 1921.)

(2) In Norway, disability is considered as temporary if after the end of medical treatment it has been reduced to less than $8^1/_3$ per cent., and as permanent, if it remains $8^1/_3$ per cent. or over.

Generally the statistics are based on the results of the first estimation of extent of disability. Such estimates are bound to be only approximate. The German decennial statistics of 1907, for example, show that more than 30 per cent. of disability cases which were first regarded as cases of permanent disability were completely cured within one year, and the Swedish statistics give the following table showing the actual and estimated disabilities for certain cases for the period 1903-1916. The "estimated disability" in per cent. is calculated according to an official scale (see below) and the "actual disability" is based on the percentage by which the earnings of the injured worker have been decreased as a result of accident.

TABLE V. — ACTUAL AND ESTIMATED DISABILITY OF PERSONS IN RECEIPT OF PENSION FOR DISABILITY OF MORE THAN 20 PER CENT. IN SWEDEN, 1903-1916 (1)

Estimated degree of disability groups	Number of persons	Percentage of actual disability	Percentage of estimated disability
20 per cent.	274	13.7	20.0
Over 20, but under 25 per cent.	3	13.3	22.0
25 per cent.	242	12.0	25.0
Over 25 but under 33 1/3 per cent.	46	23.8	30.0
33 1/3 per cent.	60	16.6	33.3
Over 33 1/3 but under 50 per cent.	92	20.6	40.3
50 per cent.	65	35.3	50.0
Over 50 but under 75 per cent.	62	32.0	62.7
75 per cent.	12	57.6	75.0
Over 75 but under 100 per cent.	4	87.5	80.0
100 per cent.	9	94.3	100.0
All groups	869	19.4	32.2

(1) RIKSFÖRSÄKRINGSANSTALTEN. *Utredning angaende den faktiska invaliditeten, etc.* By John NORDIN. Stockholm, 1921, p. 57 et seq.

It will be seen that the actual disability is proved to be much smaller than the estimated disability, averaging 19.4 instead of 32.2.

The degree of disability is usually expressed as a percentage of total disability. A totally disabled man is assumed to have a disability of 100 per cent., and the percentages for the different kinds of injury are fixed either by the medical authorities separately for each case or based on standard scales and schedules laid down by the compensation law. Hence the percentages in different countries are not at all comparable.

As the American Committee on Accident Statistics points out, "in any given case the measure adopted by the statistician would probably reflect the compensation law of the particular state as interpreted by the administrative authorities thereof". The actual scales used in some of the principal countries are given in table VI.

TABLE VI. — DEGREE OF DISABILITY ACCORDING TO VARIOUS SCALES AND RATINGS (1)

Nature of injury	Austria (percentage of wage loss)	France	Germany	Italy	Sweden	American Internat. Association
Permanent total disability	66.2/3	100	100	100	100	100
Arm above elbow, dismemberment	48.6	60–85	66.1	80	60–70	75
Arm at or below elbow, dismemberment	—	70–80	65.7	70–80	50–60	60
Hand, dismemberment	45.5	50–80	62.3	65–70	50	50
Thumb, any permanent disability	16.8	10–60	20.8	25–30	10–25	10
Any one finger, any permanent disability	9.0	3–16	5.3	8–20	2–15	5
Two fingers, any permanent disability		10–70	21.2	—	1–25	12.5
Three fingers, any permanent disability	29.0	20–60	36.7	—	5–35	20
Four fingers, any permanent disability		60	56.2	—	20–40	30
Thumb and one finger, any permanent disability		—	25	—	12–35	20
Thumb and two fingers, any permanent disability	40.2	30–50	38.7	—	14–40	23
Thumb and three fingers, any permanent disability		30–60	50	—	16–45	33.3
Thumb and four fingers, any permanent disability	—	—	62.2	—	25–50	40
Leg above knee, dismemberment	46.6	65–90	71.4	60–70	60–75	75
Leg at or below knee, dismemberment	—	43–65	55	50	50–60	50
Foot, dismemberment	—	60–65	56.6	50	20–50	40
Great toe, any permanent disability	—	5–8	4	7–15	10	5
Two or more toes, any permanent disability	—	—	4.4	—	5–10	5
One toe other than great toe, any permanent disability	—	7–20	—	5	2 1/2	—
One eye, loss of sight	23.2	33	27.6	35	20–25	30
Both eyes, loss of sight	58.5	—	100	—	100	100
One ear, loss of hearing	—	4–22	11.2	10	10	10
Both ears, loss of hearing	—	—	30	45	50	50

(1) The list of injuries is that one drawn up in the American scale, the shortest of all scales.

The sources are as follows : AUSTRIA: Workers' Accident Insurance Institutions *(Ergebnisse der Unfallstatistik, 1907-1911,* Part II), percentage of wage loss. FRANCE: Official adjudications published by the United States Bureau of Labour Statistics *(Bulletin 275).* GERMANY: Adjudications as established in practice, averages calculated by the International Labour Office (Reichsversicherungsamt, *Zusammenstellung der Entschädigungssätze,* 1912). ITALY: Ratings provided by law (published by the United States Bureau of Labour Statistics, *Bulletin 275).* SWEDEN: Official adjudications, 1901-1920 (Riksförsäkringsanstalten: *Utredning angaende den faktiska invaliditeten,* 1921). UNITED STATES: Standard scale of the Committee on Statistics of the International Association of Industrial Accident Boards and Commissions, used in many American statistics (United States Bureau of Labour Statistics, *Bulletin 276*).

The classification of accidents by degree of disability is necessary in order to calculate accident severity rates (see next section). Severity rates, however, have not yet been calculated except by one or two countries, but if severity rates become to be more generally computed, some uniform scales of degree of disabilities will have to be adopted.

Accident Exposure and Accident Risk

The numbers of industrial accidents in themselves are of little use unless related to some basis. As it is the industrial worker who is exposed to the risk of injury, it is in relation to the number of workers that the number of accidents is usually related, although in some cases another basis has been adopted, *i.e.* the number of accidents in relation to production or output, for example in the coal-mining industry the number of accidents per thousand tons of coal raised is sometimes given.

For calculating the number of workers exposed, the following methods are generally adopted:

(1) the average number of workers employed or insured;
(2) the number of "full-time workers" or the number of hours of exposure.

The first method considers the number of workers employed only, irrespective of the time during which they were employed. One hundred workers working full-time are exposed to the risk of accident much more than one hundred workers working half-time. This method therefore does not give a sufficiently accurate basis.

The second method, adopted in certain countries, consists in calculating the number of accidents per "full-time worker". This has been adopted partly because in certain countries the payment of premiums is based on this conception, and partly because it gives a more accurate measure of frequency rates. The term "full-time worker" has been defined either as:

(*a*) one who works 300 days per annum irrespective of the hours of work (*e.g.* Austria, Belgium, Finland, Netherlands, Norway, Oregon, and in Germany and Sweden as a rule);
(*b*) one who works 3,000 hours per annum (*e.g.* Germany and Sweden, in some cases, up to 1918) or, later, 2,400 hours per annum (*e.g.* Germany and Sweden, in some cases, from 1919).

This standard workman was originally considered to conform to the normal worker in normal health working every working day (1).

(1) It should be noted that the number of days normally worked in a year varies from country to country and from industry to industry according to climate and other conditions. Thus in Italy, the full-time worker in agriculture is defined as one who works 200 days per annum.

In America, where the 3,000-hour system had been adopted in theory, the term has been regarded as implying some judgment as to the proper length of the working day, and it has therefore now been modified so as not to suggest any definite length of time; the basis now proposed is per thousand or per million hours of exposure (see p. 37). Generally statistics as to the number of days worked can be directly secured, but when no direct data are available the method of computing the number of days worked according to the wages paid is sometimes employed (1).

The practical difficulties in securing the number of hours worked by each individual worker are, of course, very great. In the statistics published by the United States Bureau of Labour Statistics concerning accidents in the iron and steel industry, the method of obtaining the total man-hours for establishments not keeping accurate records of hours worked consists in recording the number of men at work or enrolled on a certain day in each month of the year and multiplying the average of these numbers by the number of hours worked by the establishment for the year. This figure is then taken as the approximate number of man-hours measuring the exposure to risk of accident for the year.

The accident exposure having been ascertained, the accident rate may be readily computed. The principal types of these rates are frequency rate, severity rate, and compensation cost rate.

Frequency Rate

Frequency rate is the number of accidents per thousand "average persons" or "full-time workers" or per thousand hours' exposure. As indicated above accident rates based simply on the average number of workers employed are not very accurate. For example, an industrial process which is running only at certain hours of the day or during certain seasons of the year may show a lower accident rate than a similar industrial process which continues during the whole day or year, whereas in practice the rate may be actually higher owing to the greater irregularity of the work. The difference in the two methods of calculating accident rates can be shown by the following table, based on figures given in the German industrial accident statistics for 1920.

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(1) This method has been used, for example, in French accident insurance statistics.

TABLE VII. — ACCIDENT FREQUENCY RATES PER 1,000 INSURED AND FULL-TIME WORKERS IN GERMANY, 1920 (1).

Trade associations	Number of insured workers	Number of full-time workers	Number of accidents	
			Per 1,000 insured workers	Per 1,000 full-time workers
Iron and Steel Association for Southern Germany	269,448	209,836	6.41	8.23
Five other iron and steel associations	841,804	786,402	6.10	6.53
Chemical	348,689	340,310	5.76	5.90
Paper manufacturing	101,107	81,802	6.67	8.24
Sugar	83,403	44,627	2.88	5.38
Building (Bavaria)	32,266	19,662	7.01	9.68
Underground constructions	226,086	142,258	6.59	10.38
All industrial associations	9,537,350	8,447,565	5.61	6.33

(1) *Amtliche Nachrichten des Reichsversicherungsamts*, 38. Jahrg., 1922, No 1.

It will be seen from the above figures that the number of full-time workers was lower than the number of actually insured workers by about 11 per cent., but in some industries it was very much lower. In the underground constructions, for example, the number of full-time workers was only about two-thirds of the number of insured workers.

Severity Rate

Accident rates as above defined are not in themselves sufficient as they do not give any indication of the economic loss resulting from accidents. A single death may often produce greater economic loss to the victim's family or to the community than a large number of minor temporary disabilities. Both classes of injury count for the same value in computing accident rates, and the accident risk in an industry in which the proportion of fatal or severe accidents is great, for example mining, may by very different from that in another industry where the proportion of accidents is very small, but the frequency rates may be the same in both industries. Hence the necessity of calculating severity rates which express the accident risk in terms of working days lost as the result of accident. The basis remains the same as in accident rates, viz. full-time worker or thousand hours' exposure.

It is thus necessary to know the time during which each victim of an industrial accident has been rendered incapable for work, and for this

purpose it is necessary to separate accidents into the principal categories of fatality, permanent disability, and temporary disability.

In the case of temporary disabilities the computation of severity rates does not give rise to any great difficulties, as the duration of disability in working days is generally known.

In the case of fatal accident the only measure which can be adopted is that of the time during which the injured person would have been able to perform his work if the accident had not occurred. As the loss of working time in cases of permanent total disability is equivalent to the full working life expectancy, the same severity weight is to be given to these cases as to fatalities.

Where the worker is partially disabled for life the method of calculating the loss of working time is somewhat more difficult. The general practice is to assume that the time loss is proportionate to the degree of disability, the determination of which has been dealt with in the previous section. Thus, if it is decided that the degree of disability caused by an accident is 30 per cent., then 30 per cent. of the average working life expectancy is taken as the time lost.

Severity rates are only used, so far as is known, in Sweden and in certain states of North America. The methods employed in these two countries differ somewhat, and in view of the novelty and importance of these rates it may be advisable to explain them more fully. In the United States, to quote from the official report:

> No American records exist to show the average age at which industrial workers cease to be employable, or the number of productive years which a wage earner of a given age may reasonably anticipate. In the absence of such records, your committee was forced to rely upon personal judgment, checked and guided by several special investigations. Working life expectancy is a function of mortality and superannuation; it is less than life expectancy by the interval between voluntary and enforced retirement from gainful employment and death. It is well known, however, that the life expectancy of our industrial population is markedly below that experienced by life insurance companies, while the evidence of accident statistics, as well as common knowledge, goes to show that relatively few wage-workers maintain a footing in industry beyond the age of 55. On the whole it seems reasonable to assume that working life expectancy, between ages 20 and 50, is about two-thirds of the full life expectancy shown by the American Experience Table. The compensation experience of a number of States indicates that the average age of persons fatally injured by industrial accidents is approximately 33 years. The Committee accordingly adopted 20 years, or 6,000 working days, as the average severity weight of fatal accidents....
>
> In the case of temporary disability this weight is the actual duration of disability in working days.... For a permanent partial disability the weight is an aliquot part of 6,000 working days proportionate to the average degree of disability resulting from the particular bodily impairment involved. (1)

(1) United States Bureau of Labour Statistics: *The Standardisation of Industrial Accident Statistics.* Bulletin No. 276. Washington, 1920.

In Sweden a special study based on 15 years' experience of accident and mortality statistics has been made, and the average working life expectancy was found to be 24.13 years for the period 1903 to 1907; 25.17 years for the period 1908 to 1912; 25.00 years from 1913 to 1917. The average working life expectancy has therefore been estimated at 25 years, or 7,500 working days. The time lost for permanent partial disability is fixed by assigning a certain weight to specific injuries, assuming that the time loss caused by accident is proportionate to the degree of disability (1).

The difference in the conclusions to be drawn from accident statistics according as severity rates or frequency rates are used may be illustrated by tables VIII and IX showing the frequency and severity rates in Sweden in 1918 and in the State of Oregon in 1915-1918. Frequency rates and severity rates are of course not comparable with each other; the first is a percentage and the second an expression of the number of days lost per full-time worker.

TABLE VIII. — FREQUENCY AND SEVERITY OF ACCIDENTS IN SOME PRINCIPAL INDUSTRIES IN SWEDEN, 1918 (1)

Industry	Full-time workers	Total accidents	Number of accidents per 100 full-time workers (Frequency rates)	Number of days lost per full-time worker (Severity rates)
Navigation, fisheries	22,146	1,662	7.5	89.49
Mining	15,527	2,408	15.5	34.60
Woodworking	58,919	5,662	9.6	17.94
Ore refining	31,073	5,432	17.5	16.73
Building industry	37,686	2,746	7.3	16.54
Metal industry	89,038	11,099	12.5	9.90
Agriculture and forestry	165,602	5,856	3.5	9.22
All industries	872,351	49,834	5.7	11.17

(1) RIKSFÖRSÄKRINGSANSTALTEN: *Olycksfall i arbete ar 1918*, Stockholm, 1922.

(1) In Sweden the severity rate is obtained by the following method:
If, in the industry, N full-time workers are employed and the accidents caused S days of temporary disability, I per cent. of permanent disability, D cases of death, and supposing that 365 days of disability correspond to 300 working days, the loss of working days per full-time worker (K) is given by the following formula:

$$K = \frac{1}{N} \times \left(\frac{300}{365} S + 75\,I + 7500\,D\right)$$

The application of this formula gave in the period 1903-1917 the following figures:

Temporary disability	1.90 days
Permanent disability	5.46 days
Fatalities	4.22 days
Total	11.58 days per full-time worker.

(RIKSFÖRSÄKRINGSANSTALTEN, *Olycksfall i arbete ar 1918*; Sveriges officiella Statistik. Socialstatistik. Stockholm, 1922.)

TABLE IX. — FREQUENCY AND SEVERITY OF ACCIDENTS IN OREGON, 1915-1918 (1)

Industries	Full-time workers	Total accidents	Number of accidents per 100 full-time workers (Frequency rates)	Number of days lost per full-time worker (Severity rates)
Mining and quarrying	3,641	768	21.1	40.70
Manufacturing	71,249	14,642	20.6	23.67
Construction	27,112	7,699	28.4	22.64
Transportation and public utilities	12,046	1,428	11.9	21.28
Agriculture	1,909	162	8.5	18.55
Trade	4,513	375	8.3	5.51
Service	803	45	5.6	10.83
Total	121,273	25,119	20.7	22.87

(1) *Third Report of the State Industrial Accident Commission showing the cumulative experience for the Three-year Period ending 30 June 1918.* Salem, Oregon, 1920,

From these tables it will be seen that the industries in which accidents occur most frequently are not always those in which the loss due to accidents is the greatest. In Sweden the frequency rate was about the same in building and in navigation, but the severity rate was more than five times higher in the latter than in the former industry. In Oregon the frequency rate is about the same in mining and in manufacturing, but the severity rate for mining is almost double that for manufacturing.

Compensation Cost Rate

The frequency and severity rates are the two principal methods from the statistical point of view. There is, however, another rate frequently used known as the compensation cost rate. This is simply the cost of accidents per total wages paid. It is useful for the fixing of insurance premiums and for showing the charges for accidents in the different industries, especially where the compensation paid to the worker depends upon the amount of his earnings. It is not a measure of the accident risk as it is entirely dependent on the legislative provisions relating to benefits, and a change in these provisions might cause a change in the rate without any change in the accident risk. This rate is therefore less appropriate for international comparisons than the rates previously mentioned. Its use, in connection with other charges placed upon industry is rather outside the scope of industrial accident statistics; it is therefore not dealt with in the present Report.

CHAPTER II

Standardisation of Industrial Accident Statistics

Previous Attempts at Standardisation

Analysis in the preceding chapters of the chief classes of industrial accident statistics has shown that existing statistics are not in general comparable between different countries. They all depend to a large extent on the administration of the various laws respecting compensation and prevention of accidents, and the statistics in general are such as have been deemed necessary for administrating the legislation. Hence any scheme for complete standardisation is quite out of the question at the present time, but the necessity of internationally comparable accident statistics has been repeatedly urged; for such statistics, however limited in their scope, would be of great value to each country in furnishing information as to the accident risk in the different countries, the chief causes of accidents, perhaps as to the results of measures and of prevention. The problem of standardisation of accident statistics was first dealt with by the International Accident and Social Insurance Congresses. The first congress dealing with industrial accident statistics was held in Paris in 1889, followed by one in Berne (1891), Milan (1894), Brussels (1897), Paris (1900), and Dusseldorf (1902), but very little progress was made. Also the International Statistical Institute discussed the question of international industrial accident statistics, and in its session held in London 1905 an important recommendation was carried which began as follows:

> The International Statistical Institute, considering that international statistics of accidents are indispensable as a means of guiding employers in methods of prevention and of safety, insurance institutions in the fixing of premiums, the legislator in drafting social legislation, and the administrative departments in applying legislation:
>
> In view of the resolutions of the International Congresses on Industrial Accidents and Workmen's Insurance at Paris, Berne, Milan, and especially at Dusseldorf in 1902;

In view of the necessity of arriving at a unification of national accident statistics as far as the legislation and insurance organisation of each country permits;

Recommends to the different countries to base their accident statistics on the (following) general principles (1):

[Here follows the enumeration of eight general principles to be dealt with later.]

A Joint Committee of the Industrial Accidents and Insurance Congress and International Statistical Institute, referred to hereafter as the International Joint Committee, was nominated in 1905, and in 1909 it presented a report on standardisation of schemes; in 1913 an international survey of accident statistics was published (2). Thus a basis had been laid down for the work, but the outbreak of war interrupted any further developments.

At this time, however, the problem was taken up independently on the other side of the Atlantic. The situation had developed in the United States somewhat similar to that in Europe in that each of the several states of North America had developed their own accident statistics independently of each other. In 1915 a committee on statistics and compensation insurance cost (referred to in the future as the American Committee) was constituted by the National (or after Canada joined, "International") Association of Industrial Accident Boards and Commissions with a view to creating uniformity among the accident statistics of the various states and provinces of the two American countries. A résumé of this work was published in 1920 (3) and its schemes have already been applied to a certain extent in the statistics published by certain States and by the Federal Bureau of Labour Statistics.

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(1) "L'Institut international de Statistique, considérant que la statistique internationale des accidents est indispensable pour guider les industriels dans les mesures de prévention et de sécurité du travail, les établissements d'assurance, dans la fixation de leurs primes, le législateur, dans la rédaction des lois sociales, et l'administration, dans l'application de ces lois:

"Vu les résolutions des Congrès internationaux des accidents du travail et des assurances ouvrières de Paris, de Berne, de Milan et notamment de Dusseldorf en 1902;

"Vu l'utilité d'arriver à l'unification des statistiques nationales d'accidents, dans la mesure que comportent pour chaque pays les exigences de sa législation et de son organisation d'assurance;

"Recommande aux divers pays de conformer leur statistique nationale des accidents aux principes généraux..."

(Cf. *Bulletin de l'Institut international de statistique*, Vol. XV, 2nd part, pp. 54–55. London, 1906.)

(2) Fuster: "Statistique internationale des accidents du travail." *Bulletin des Assurances sociales*, Vol. XXIV, No. 5. Paris, 1913.

(3) United States Bureau of Labour Statistics: *The Standardization of Industrial Accident Statistics*. Bulletin 276. Washington, 1920.

These two schemes of standardisation had different objects. The European Committee proposed to expose only the minimum of common statistics which all countries compiling accident statistics should adopt and which would allow for further elaboration and divisions as each country found necessary. It did not propose to change the old existing statistics, but "with all discretion and respect towards these" to endeavour to find out the important questions to which most statisticians could or should give a reply. The object of the American Committee has been to create a radical reform of the accident statistics of the various States. The compensation systems in the United States being comparatively of recent date, in general from about 1911, the different statistics are of more or less recent origin and an attempt to develop them along standard lines has better chance of success than in Europe. The American Committee therefore took very little notice of existing statistics but worked out an *a priori* scheme which is logically the best to be applied in practice.

Definition of Industrial Accident

As pointed out in Chapter I, it is impossible to give any generally acceptable definition of "industrial accident", and no standard definition has been attempted.

The International Joint Committee does not touch upon the question of the definition of various kinds of industrial accidents (notifiable accidents, compensable accidents, etc.), but is satisfied with merely noting the differences. The American Committee proposes the following definitions:

1. *Reportable Accidents.* Reportable accidents, diseases and injuries should include all tabulatable accidents, diseases and injuries, and all non-tabulatable accidents, diseases and injuries which require any medical expenditure.

2. *Tabulatable Accidents, Diseases, and Injuries.* All accidents, diseases and injuries arising out of the employment and resulting in death, permanent disability or in the loss of time other than the remainder of the day, shift or turn on which the injury was incurred should be classified as tabulatable accidents, diseases and injuries, and a report of all such accidents, diseases and injuries to some State or national authority should be required.

3. *Compensable Accidents.* A compensable accident is one which is subject to compensation under the law of the particular State in question

As regards tabulatable accidents, that is, accidents which are taken into account in compiling accident statistics, it will be seen

that the test is taken to be that the accident should result in a loss of time other than the remainder of the day, etc., on which the accident happened, that is, if the worker does not return to work on the day following the accident, the accident must be reported to the competent authority. This is a very high standard of perfection which has not much chance of being adopted at present in many European countries and would probably lead to a very large number of trivial accidents being reported which would not be worth the trouble of reporting.

The class of accidents most frequently dealt with within accident statistics is that of "compensable accidents" or those for which the worker is liable to receive compensation. Here again international comparisons are at present impossible, chiefly owing to the difference in the "waiting periods". In some countries a workman is compensated if the disability lasts more than two days, while in Denmark and Germany thirteen weeks must elapse before the worker can come upon the accident insurance fund.

Classification of Industries

Both the International Joint Committee and the American Committee dealt with this question. The former laid down the following principle:

> The different countries are invited to draw up an industrial classification which is neither too large nor too narrow, confining themselves, as far as possible, to the chief common divisions, leaving each country free to subdivide them, according to the nature of the national industries, the scheme of its occupational census, and the classes in use by the insurance companies (1).

Subsequently the Committee considered that the most urgent thing would be the establishment of a classification as uniform as possible of the great groups of industries; the list of such principal industrial groups as recommended is given in Appendix II. This classification is not very satisfactory as it excludes certain groups now covered by accident statistics, for example domestic

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(1) « Les différents pays sont invités à arrêter une classification industrielle, qui ne soit ni trop large ni trop étroite, en s'astreignant, autant que possible, à l'identité des grandes divisions, sauf à chaque pays à les subdiviser, d'après les convenances de ses industries nationales, les cadres de ses recensements professionnels et les catégories en usage dans la pratique de ses assurances. »

service, and it does not correspond to any of the classifications actually in use. Subsequently the editors of the above list recommended that the *répertoire technologique*, prepared for the International Statistical Institute in 1909, should be used as a basis of comparison (1).

The American Committee attempted to prepare a logical table of industries basing these on the 1,500 classifications already existing by the different insurance companies and commissions in the United States. They endeavoured to see if they could be arranged under a reasonable number of headings, taking the nature of the business as a criterion. Many classifications were worked out but experience proved that they were unsuitable and inadequate for practical purposes Even in its revised form as published in 1920 the classification is considered as imperfect and subject to modification from time to time. It is claimed by its authors, on the other hand, as "the best of its kind yet produced". In this classification there are eight principal divisions divided into 36 schedules, again divided into 153 groups. These groups are finally to be divided into classifications, but these have not yet been drawn up. A summary of their scheme is given in Appendix II.

As a practical step towards a standard classification of industries, Mr. Fuster, of the Permanent Committee of the International Conference of Social Insurance, proposed the following procedure: National statisticians should write against each number in the standard classification the corresponding number or numbers in their own classification, and inversely against each number of their classification, the corresponding number or numbers of the standard classification. As this standard classification is to be based on a decimal system, any further sub-divisions or new groups necessary could easily be inserted therein. Special information should be given of the groups for which details are available. By means of such an "international inventory" it would be possible to compile international accident statistics for a certain number of industries and countries, and, on the other hand, the national statisticians would probably be stimulated to modify, to improve, or to extend their investigations along the standard method adopted as opportunities arose.

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(1) For this classification, see Appendix III of the *Report on Systems of Classification of Industries and Occupations* published by the International Labour Office.

Causes of Accidents

In most countries the causes of an accident are those indicated by the reporting person, *i. e.* the employer or his agent, the factory inspector or the medical officer, but, as pointed out in Chapter I, an accident may have numerous causes, some of which are the effects of previous causes. The principle adopted by the International Joint Committee was as follows:

> Causes by industry are to be classed in special tables and compared with the results of accidents, in conformity with the classifications adopted in the legislation of each country for compensation for accidents according to their gravity (1).

A classification which they made accordingly is given in Appendix II. This classification is merely an abstract of existing classification in European countries, arranged so as to comprise all the more important groups of causes to be found among the various statistics published. The American Committee, on the other hand, proposes to present a logical system of causes which "points to the most immediate and tangible preventives of accidents". Their definition of cause of accidents is as follows:

> The accident shall be charged to that conditional circumstance the absence of which would have prevented the accident, but if there are more than one such conditional circumstances, then to the one most easily prevented.

The causes are grouped into eleven general headings which are divided into a number of sub-headings; these sub-headings are made still more specific by division into classes. The principal points of this classification are given in Appendix II. The first and most important of the general headings is that of machinery which is divided into six classes: (*a*) prime movers, (*b*) power transmission apparatus, (*c*) power working machinery, (*d*) machines other than working machines, (*e*) hoisting appparatus, (*f*) conveyors. The third group — power working machinery — is classified by industry, and within each industrial group the principal types of working machines are grouped by operative hasard. It is also recommended that a detailed analysis of machine accidents should be given by the "manner of occurrence" and the " part of the machine ".

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(1) « Des tableaux spéciaux classeront les causes par industrie et les rapprocheront de leurs conséquences conformément aux classifications adoptées par la loi de chaque pays pour la réparation des accidents d'après leur gravité. »

The classification of accidents by causes is prepared on a basis of the decimal system so as to allow expansion in each class, and to allow for adaptation to the accident statistics of the different states of the United States. This classification of causes has been applied with some modification in many states, and good results seem to have been achieved. In this respect the standard classification has really created improvement in the United States statistics and it is superior to any classification hitherto adopted.

Location and Nature of Injury

As pointed out in Chapter I there should always be a distinction between classification by location and classification by nature of injury. The International Joint Committee was satisfied with presenting only one simple mixed classification of location and nature of injury, considering that this would correspond to the present possibilities and needs of international accident statistics. Their classification is given in Appendix II and comprises ten groups only. Even this simple scheme, however, cannot be applied to the accident statistics of the different countries.

The American Committee prepared two distinct classifications for both location and nature of injury. In the first one the common anatomical divisions are followed. It comprises five main groups: head; face and neck; trunk; upper extremities; lower extremities. These are sub-divided, however, into 93 headings. The classification by nature of injury consists of 12 groups, which will also be found in Appendix II.

Comparison of the American standard classification with those in use in some European countries will show that they conform in general principle, but differ considerably as regards detail. It should be possible, however, to establish a list on uniform lines which can be suitably expanded where necessary to cover the different existing statistics.

Extent and Degree of Disability

The International Joint Committee confines itself to a simple classification of four groups, viz:

1. Temporary disability.
2. Permanent partial disability.

3. Permanent total disability.
4. Fatality.

The American Committee proposes a more detailed classification based on the same four groups, but further sub-divided. It is as follows:

1. Fatal.
2. Permanent total disability:
   (*a*) dismemberment;
   (*b*) other cases.
3. Permanent partial disability:
   (*a*) dismemberment;
   (*b*) total loss of use;
   (*c*) impairment of use;
   (*d*) disfigurement;
   (*e*) other cases.
4. Temporary total disability.
5. Temporary partial disability.

The American Committee does not define these different groups, except Nos. 2 and 3. Their definitions are as follows:

Permanent Total Disability.

Permanent total disability should include every accident, disease, or injury which is designated by statute as permanent total disability of which permanently incapacitates workmen from performing any work continuously in any gainful occupation.

Permanent Partial Disability.

Permanent partial disability should include every accident, disease, or injury (less than permanent total disability) which results in the loss of any member of the body or part thereof or in the permanent impairment of any functions of the body.

As regards fatalities it may be thought that no definition may be required of this category, but a difficulty arises where a workman dies as the result of an accident some time after the occurrence of the accident(1). The degree of disability does not, of course, apply to fatal accidents nor in general to permanent total disabilities, which last throughout the whole life. The permanent partial disabilities and temporary disabilities, however, should be classified according to the degree of disability. The scales according to which these degrees are allocated to various injuries depend on the law and on administrative practice of the various countries, which generally rate a worker on a certain scale according to loss of

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1 See above, p. 19.

earning capacity. It would be desirable if a fixed classification could be given somewhat on the following lines:

(*a*) Under 20 per cent.
(*b*) 20 and under 40 per cent.
(*c*) 40 and under 60 per cent.
(*d*) 60 and under 80 per cent.
(*e*) 80 and under 100 per cent.

The duration of disability applies only to temporary disabilities; uniformity in regard to practice in this respect could be improved without any great difficulty. A rough uniformity could be secured, for instance, by using the following duration groups:

(*a*) One week or less.
(*b*) More than one and up to two weeks.
(*c*) More than two and up to four weeks.
(*d*) More than four and up to six weeks.
(*e*) More than six and up to thirteen weeks.
(*f*) More than thirteen weeks and up to six months; and thence in six-monthly groups upwards, up to three years.

Accident Rates

The accident rates being merely a mathematical formula applied to statistics, they do not depend on the differing legislations of the various countries and therefore it should be possible to arrive at some agreement on this subject.

Frequency Rates

As regards frequency rates the recommendations of the International Joint Committee run as follows:

1. For each industry should be obtained, its accident risk, *i.e.* the proportion between the number of victims of accidents and the number of workers exposed to accident;
2. The number of victims of accidents will be supplied by the notifications of accidents, the accidents records, and legal decisions;
3. The numbers exposed to accidents will be supplied by calculating from the number of effective workmen, the number of full-time workers, *i.e.* the number of workers who have worked 300 full days of 10 hours per day;
4. The data for calculating this number will be furnished by the insurance organisations. In cases where insurance, not being compulsory,

does not cover all the workers subject to the accident legislation, each country will endeavour to supply the information concerning the non-insured, out of its own records (1).

This is a recommendation that frequency rates should be calculated on a basis of full-time workers who work 300 complete days of ten hours each.

The American Committee in dealing with this subject did not approve of the above definition, and recommended that the basis should not be one of 3,000 hours per annum but a thousand or a million hours. This avoids any implication that the normal hours of work are ten hours per day or that the normal working days per year are 300.

The recommendation is as follows:

> Accident frequency rates should be expressed in terms of the number of accidents per 1,000,000 hours of working time. The basis used should be the actual number of man-hours for the year; that is, the total working time for all employees of the establishment or the department for the year reduced to the number of hours required for one man to do the same work. This should be taken from exact records if such records are in existence. If this exact information is not available in this form in their records, then an approximation should be computed by taking the number of men at work (or enrolled) on a certain day of each month in the year, and the average of these numbers multiplied by the number of hours worked by the establishment for the year would be the number of man hours measuring the exposure to risk for the year.

Unfortunately in very few cases is it possible to know the number of hours worked by each individual, and even the suggested approximation thereto, viz. the number of hours worked by the establishment during the year multiplied by the average number of workers, is not always available. The large well-managed undertakings would no doubt be able to furnish the information though it would involve in many cases a very large addition of work, but for the very

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(1) « 1. On s'efforce d'obtenir, pour chaque industrie, son coefficient de risques, c'est-à-dire le rapport du nombre des victimes d'accidents, ou des sinistrés, au nombre des ouvriers soumis au risque, ou des sinistrables.

2. Le nombre des sinistrés sera fourni par les déclarations d'accidents, les fiches de sinistres et les décisions de justice.

3. Le nombre des sinistrables sera calculé en ramenant le nombre des ouvriers effectifs au nombre d'*ouvriers-types*, *d'unités ouvrières*, ou de *Vollarbeiter*, c'est-à-dire d'ouvriers ayant travaillé 300 journées pleines, de chacune 10 heures.

4. Les éléments de ce nombre proviendront des établissements d'assurance. Là où l'assurance n'étant pas obligatoire n'embrasse pas la totalité des assujettis, chaque pays s'arrangera pour trouver dans son organisation particulière les moyens de combler les lacunes relatives aux non-assurés. »

numerous small undertakings it would be impossible to give the information, as has been already experienced in most countries in which it has been attempted. Until, therefore, there is an improvement in the establishment records, accident exposure is bound to remain an approximation with a higher or lesser degree of accuracy. All countries, however, might adopt this unit of exposure as a measure to be aimed at, and, with the present state of affairs, it would perhaps be easiest to secure an agreement if the 300-day workers were to be taken as a basis.

Severity Rates

With regard to severity rates, these are a modern conception unknown at the time when the scheme of the International Joint Committee was prepared. The definition of these rates formulated by the American Committee is as follows:

> Accident severity should be expressed in terms of days lost per thousand hours exposure of the working force, computed in accordance with the following table (1).

Here the basic unit is the same as in the frequency rates, viz. hours of exposure, the only differences being that in one case the million hours is taken and in the other case a thousand. This difference is made merely to avoid decimal figures.

The principle that severity should be expressed in terms of time lost is no doubt the best expression of the economic cost of industrial accidents, but it is not clear why the accident exposure should be expressed in hours and the actual time lost by accidents expressed in days.

The question of the actual time lost to be allocated to the different classes of accidents is a difficult one. With regard to permanent total disabilities and fatalities, obviously the actual loss of working life is the only basis. The American Committee suggests that 6,000 days should be taken as the average loss in these cases, while, as pointed out in Chapter I, careful calculations in Sweden have estimated the same figure at 7,500 days. As regards the time lost in temporary disabilities, here the only sound basis in the case of temporary total disability is the actual records of the injured workers and the actual time lost before their return to work, but as regards permanent partial disabilities, there is no scientific

(1) See Appendix II.

test as to what exactly has been lost by industry or by the worker owing to the worker's reduced capacity for work or for earning his living. The weighting adopted in any case can only be simple and rough; a scheme adopted by the American Committee is given in Appendix II.

Both these questions, viz. the time lost for fatalities and total disabilities as well as that of the percentages or proportions to be allowed for partial disabilities, still need further enquiry and statistical investigation as well as discussion on the part of the statisticians of the different countries.

The Reporting and Tabulating of Accidents

The above sections dealt with the methods to be adopted in utilising accident statistics, but a further question arises as to the reporting of accidents, about which some remarks should be made.

Accurate and complete reporting of industrial accidents is a fundamental requirement in all accident statistics. The reporting of all accidents for which compensation be made may in general be regarded as quite reliable. But the large group of other accidents which are not compensated are very differently reported in different countries. In some countries the notification of these accidents is not required, in others it is voluntary, and in others again it is compulsory; in some countries provisions are different with regard to large and small undertakings, etc. The differences in the present state of accident reporting are dealt with in Appendix I.

There is no possibility of introducing an agreement on these lines in the present state of compensation legislation, but it can be recommended that detailed explanations of the methods of reporting employed should be given by each country in its statistical publications.

As regards the tabulation of accident statistics, sufficient tables should of course be given to show the classification of the headings enumerated in the previous paragraphs. The International Joint Committee was satisfied with three standard tables and three subsidiary tables for which in its belief practically all statistics were likely to supply material. These tables were as follows:

Table A. Showing by industries the number of full-time workers, number of reported and compensated accidents, the extent of disability, and all dependents of killed persons:

1. Absolute numbers,
2. Frequency rates,

and also giving three subsidiary tables, the degree of permanent disability, the development of permanent disability, duration of temporary disability.

Table B. Injuries produced by accidents, giving by industries the number of accidents by ten groups of location and nature of injury.

Table C. Causes of accidents, giving the number of accidents by industries for 16 cause groups:

1. Absolute numbers,
2. Frequency rates.

The American Committee put forward 16 standard tables "so designed as to admit of adaptation to the administrative needs and financial resources of different jurisdictions." It is not necessary to give their specimen forms in full but only the headings, which are as follows:

Table 1. Frequency of accidents, by industries and extent of disability.

Table 2. Severity of injuries, by industries and extent of disability.

Table 3. Causes of accidents, by extent of disability.

Table 4. Compensation and medical aid incurred on account of accidents, by extent of disability.

Table 5. Compensation and medical aid incurred on account of occupational diseases, by extent of disability.

Table 6. Permanent partial disabilities, by location of injury and percentage of impairment of member.

Table 7. Permanent disabilities by percentage or impairment of earning capacity.

Table 8. Infected injuries, by nature of injury and extent of resulting disability.

Table 9. Nature of injury, by cause.

Table 10. Accidents, by nature and location of injury and extent of disability.

Table 11. Sex and wages of injured.

Table 12. Sex and age of injured.

Table 13. Cost of medical and hospital treatment by nature of injury and amount of medical aid per case.

Table 14. Duration of total disability in permanent partial disability cases, by nature of permanent disability.

Table 15. Summary of condition of industrial cripples as disclosed by investigation one year after injury.

Table 16. Summary of re-marriage experience of widows to whom compensation awards have been made, for each year, by age (nearest birthday) of widow at death of husband.

Conclusion

In conclusion it will be seen that the schemes of standardisation of industrial accident statistics briefly analysed above have not yet resulted in any important practical improvement in the uniformity and comparability of the different statistics. On the whole, the scheme of the International Joint Committee is in many respects now out of date and even immature, while the more recent scheme of the American Committee is perhaps too detailed and has too *a priori* a character to be accepted without considerable modification on the part of European countries. Hence, renewed discussion of the standardisation of accident statistics in Europe and America is necessary, and it is to provide some basis for such a discussion that the present survey of the principal theoretical and practical points of accident statistics has been prepared.

APPENDIX I

The Relation of Industrial Accident Statistics to Legislation

Different Types of Statistics

As has been mentioned in the general report, industrial accident statistics are connected with the legislation and administration regarding (*a*) the prevention of accidents, and (*b*) compensation for injuries resulting from accidents. Statistics and information on the prevention of accidents will mostly be found in reports of mining and factory inspection, etc. An examination of these statistics shows that they are not usually complete, and that their principal value lies in the description of, and enquiry into, certain particularly dangerous occurrences. Statistics connected with workmen's compensation and insurance against accidents form, in general, more or less systematic studies in industrial accident risk, and the causes, consequences and other aspects of accidents in the various industries. It is this class of industrial accident statistics that presents the chief interest in an analysis of methods of compiling these statistics, and has therefore been taken into consideration in this report (1). In some countries, however, including such important industrial countries as France and the United Kingdom, statistics of workmen's compensation are limited to the purely financial aspects of the problem. In these cases, therefore, also statistics of mining and factory inspection are to be taken into consideration.

In the United States, again, each of the states and territories (except seven) and the Federal Government, as well as in Canada all the provinces (except two) and the Dominion Government have enacted workmen's compensation laws, mainly since 1911. These laws differ widely

(1) It is to be noted that the available industrial accident statistics refer only to pre-war years in many countries, *e. g.* in Austria, Belgium, Hungary, Italy, Luxemburg, etc., while the legislation has undergone more or less important changes during and after the war. In the following, the legislation forming the basis of actual statistics will receive chief attention, though also the most important of the latest changes have been noted.

as regards all the important points, and the statistics compiled in connection with these laws are of very different scope and value (1). In this report, therefore, only summary statements are presented for these American countries.

Different Systems of Compensation and Insurance

The legal basis of the industrial accident statistics is, then, in most cases the legislation relating to the compensation of industrial accidents. This legislation is based in the various countries upon different legal conceptions and systems. The provisions of the *Code civil* in Continental Europe, and of the British Common Law in the Anglo-Saxon countries were originally modified by means of extention of the principle of "employer's liability" for compensation of injuries, caused by fault or negligence on the part of himself, or persons for whom he is responsible. Modern legislation has, however, passed far beyond this very limited principle. A new principle, that of "workmen's compensation", has been gradually developed; by means of this, the employer's liability has been extended, first, to accidents arising out of certain industrial processes, not due to anybody's fault or negligence ("the risk of employment"), that is to say, to all accidents except to those due to the fault of the workman, then to all accidents save to those due to gross negligence or wilful misconduct of workmen, and, finally, to all accidents almost without exceptions.

Workmen's compensation laws are generally compulsory, all employers covered by the law being liable for the compensation of the industrial accidents sustained by their employees. In several of the American states, however, the compensation law, to avoid constitutional difficulties (2), is only "elective" (optional). This means that the election by both employers and workmen to abide by the law must be made before the accident occurs, as a part of labour contract. In case the employer rejects the Act, the customary common law "defenses" (3) are usually abrogated, so that the employer, while not liable to compensate

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(1) While valuable comparisons have been published as regards the compensation systems and legislation in the United States and Canada (see *Bulletin of the United States Bureau of Labour Statistics*, 1920 and 1922, Nos. 275 and 301), there are no such comparative studies in respect to the methods of the various statistics of accidents. For general criticism of the present day State statistics, see an article called *Inadequacy of Industrial Accident Statistics published in State Reports (Monthly Labour Review*, March 1921) and Bulletin 339 of U.S. Bureau of Labour Statistics : *The Statistics of Industrial Accidents*, 1923. The endeavours made towards a stabilisation of the accident statistics of America have been discussed in the general report, Chapter II.

(2) The two most serious constitutional difficulties appeared to be (*a*) that the making the employer responsible for an accident admittedly without any fault on his part was opposed to the constitutional rule that property shall not be taken without due process of law, and (*b*) that the automatic determination of damages deprived the employer from his right of trial.

(3) The defenses in the Common Law of Employer's Liability, known as the defense of assumption of ordinary risks, of fellow-servant's fault, and of contributory negligence. Cf. for example an article by E. Freund, in the *American Labour Legislation Review*, 1911, pp. 89 sqq.

for all accidents, will have increased legal expenses and heavy verdicts for some of the accidents. As to the employee he has usually to choose only between the old employer's liability (the "defenses" remaining in force) and the compensation plan. In practice, the majority of labour contracts have accepted the elective compensation Acts (1).

As compensation laws shift the loss due to industrial accidents from the workman to the employer, the latter is entitled or encouraged to transfer the burden of the accident risk to insurance institutions, private or public. In this system of voluntary accident insurance, however, it is still the individual employer who remains legally responsible for the compensation of the accidents.

The entire principle of the individual employer's liability, in its extended form known as the principle of workmen's compensation, is often replaced by another principle, viz. that of a collective responsibility of the industry for the compensation of industrial accidents. This is the case in those countries where the system of compulsory insurance against industrial accidents has been adopted, *i.e.* in most countries of Continental Europe.

The systems of accident compensation and insurance may thus be discriminated into the following groups:

(1) Compulsory accident insurance, with collective or individual responsibility.
(2) Compulsory compensation, together with voluntary insurance.
(3) Elective compensation, with voluntary or compulsory insurance.

The system of compulsory insurance with collective responsibility exists in Austria, Canada, Denmark, Czechoslovakia, Finland, Germany, Hungary, Italy, Luxemburg, Netherlands, Norway, Sweden, Switzerland, and, with individual responsibility, in three of the American states. There are two forms of insurance, viz. (*a*) enforcing insurance in prescribed institutions or funds; and (*b*) leaving free the choice of insurance institutions. The former form exists in Austria, Czechoslovakia, Hungary, Luxemburg, Switzerland (mutual associations on territorial basis controlled by the State), in Germany (mutual associations organised on industrial lines), and in Norway as well as in five Canadian provinces and in the three American states (exclusive State insurance funds). The latter form of insurance exists in Denmark, Finland, Italy, Netherlands, Sweden and one Canadian province, where insurance is carried by private companies or mutual associations, with a state institution competing in each country, save Denmark and Finland.

Compensation is compulsory, but the insurance voluntary in Austria, South Africa, Argentine, Chili, India, Spain, New Zeeland, Peru, San Salvador, Belgium, France, United Kingdom, two Canadian provinces and several American states. Insurance, when adopted by the employers, is carried by private companies or mutual associations, while

(1) About 75 to 85 per cent. of the employers have accepted the Compensation Acts in the elective states, and very few employees have rejected the same. There is nevertheless considerable dissatisfaction with the system. Cf. *Bulletin of the United States Bureau of Labour Statistics*, 1920, No. 275, pp. 8, 12, 14, 37-39.

in the two former countries also a state institution exists alongside the private institutions. In thirteen of the American states, where the compensation is compulsory, the employers may "provide self-insurance", if they do not insure in state or private institutions; in one state with a compulsory compensation law, no insurance is required. There is an exclusive state fund in one state and competitive state funds in five states. There are exclusive state funds in five provinces. Notwithstanding the various forms of these systems, which are called in many cases "systems of compulsory insurance", all of them are most closely comparable with the system of voluntary insurance.

Compensation is "elective" in a majority (31) of the American states. The insurance is strictly compulsory for "electing employers" in four states. Insurance is required, but self-insurance permitted, in twenty-four states. No insurance is required in three states. There are exclusive state funds in three of these states, and competitive state funds in four.

Differences in the Scope of Existing Statistics (1)

The influence of the legislation makes itself most felt with regard to the scope of the various accident statistics, since quite different groups of industrial accidents are reported and compensated under the different legal systems and administrative practices.

The majority of the existing statistics cover only the compensable accidents, *i.e.* those for which compensation has been or is to be paid under the law. It is important to know exactly what accidents are included in this group of "compensable accidents". The legal provisions vary in regard to :

(1) Limitations as to employments covered;
(2) Limitations as to persons compensated; and
(3) Limitations as to injuries covered.

With reference to employments covered the compensation and insurance law has shown a tendency to develop from strict limitations to universality. The various countries occupy. however, a very different place between these extremities. It may be noticed that, in general, the employments were originally divided into "hazardous" and "non-hazardous" ones; and as it could not be anticipated that wages in the former group were higher than in the latter, the employers in the hazardous industries were made liable to pay compensation for the injured workers or their dependents, so as to make the working conditions to approximate in the two groups of employments. This principle has

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(1) The following notes do not aim at a complete exposition of the scope of the different accident laws, but only at some general indications necessary for the understanding of the existing accident statistics.

been applied so that, on the one hand, mining and quarrying, factories and workshops, construction, and transport, and on the other hand, any employment using machinery or explosives were covered in the first case. While these industries are at present covered in practically all countries concerned, there are still certain limitations as to their inclusion in the compensation and insurance system. As to manufacturing industry, it is usually expressly provided that machinery or other than hand power must be used (Belgium, Germany, Norway), or alternatively, that a stipulated number of workers must be employed (at least five in Belgium, ten in Germany, twenty in Austria and Czechoslovakia). The condition as to a certain minimum of workers employed is also applicable to other industries in a few cases (e.g. in construction, generally at least five workers must be employed in Finland, and in transport, at least five workers must be employed in Italy). The navigation and fishing industries have often been treated in the compensation laws apart from other industries. It was clear that the hazardousness of these employments pre-destined them to be covered by this law, but, on the other hand, their particular character made the question of their compensation especially difficult. In a number of countries they have been covered later than other employments, but are at present generally covered. As to fishing, there are certain restrictions; for instance, only fishing on high seas was covered in old Austria, only undertakings employing three or more workers are covered in Finland, only fishing on inland waters in Netherlands, while shore fishermen are excluded in the United Kingdom. In many countries there are special compensation systems for seamen (in Australia, Belgium, Finland, France, Germany, Greece, Italy, Netherlands, and Norway), and for fishermen (Norway, Denmark, Sweden); often there are also special statistics of accidents sustained by these classes of workers.

As regards the so-called non-hazardous employments the provisions of the various laws differ more. Agriculture and forestry have been brought into the list of industries covered slowly and to a limited extent. These industries are still generally excluded from the scope of compensation law in the United States and Canada, although they are the more "hazardous" in this part of the world on account of the modern machinery used. In the European countries, again, the employments concerned were originally covered only so far as machinery was used, or so far as the workers were "in proximity to power machinery", or, so far as a stipulated minimum of workers was employed, or in one case, only in respect to large estates (in Denmark up to 1916). At present still, agriculture and forestry are covered in Austria and Hungary only if machinery is used otherwise than temporarily; agriculture is covered in Belgium only so far as three or more persons are employed, in Finland only so far as machinery is used for more than 14 days per annum, in Norway only if mechanical power is employed, in Spain only if more than six workers are employed and if mechanical power is used. The development of accident compensation and insurance has in later times shown a clear tendency to cover agriculture and forestry under the same terms as other principal employments, partly because the accident statistics have proved that the accident risk in these

industries is quite as high as, *e.g.*, in many branches of manufacturing industry. Thus it appears that these industries are at present covered without restrictions of the kind indicated above in Denmark, France (except small farmers working alone), Germany, Italy, Netherlands, Sweden, and the United Kingdom.

Commercial and similar establishments having generally a low accident risk are covered usually only in special cases (loading and unloading, despatching, warehouses, etc.), but they are generally covered in Denmark, France, Netherlands, Spain, Sweden, Switzerland, and United Kingdom.

Finally, most countries exempt from the compensation system: handicrafts, domestic service, casual labour, aviation, theatres, cinematographs, etc. There are, however, numerous exceptions to this rule, but because of the great variety of the provisions in force, this question may not suitably be dealt with in this survey.

The evolution of accident compensation and insurance shows a general tendency towards the abolition of the distinction between hazardous and non-hazardous employments. There are at present several countries where, in principle, all employments and industries are covered, if not specifically excluded, viz. Denmark, Netherlands Sweden, the United Kingdom, and the Serb-Croat-Slovene Kingdom.

The limitations as to persons covered are also varying. There are four classes of employees who are often treated separately in the compensation laws, namely,

(*a*) Manual workers,
(*b*) Apprentices and volunteers,
(*c*) Supervisors and employees,
(*d*) Public and municipal employees.

The first group, manual workmen, working "for wages" or "under labour contract" is, of course, universally covered.

The second group, apprentices and volunteers, is mostly covered under the same terms as workmen, sometimes even irrespective of whether they are receiving wages or not (Denmark, Norway, Sweden, and Italy), but in other cases subject to the condition that they are in receipt of wages (Finland).

The group of supervisors and employees is covered under the same terms as workmen, subject only to the condition that they are "regularly employed" in some countries (Austria, Denmark, France, Netherlands, and most of the American states), but in most countries only in cases where their earnings do not exceed a specified sum, which ranges considerably from country to country, being, for instance, 2,400 (since 1919, 7,500) francs per annum in Belgium, 15.000 marks in Finland, 2,400 francs in France, 7 (since 1918, 20) lire per day in Italy, 5,000 (since 1919, 9,000) kronor per annum in Sweden, and £350 (as to non-manual workers only) in the United Kingdom.

The public and municipal employees, finally, are covered under the same terms as private employees in most cases. In a few cases this is

subject to the condition that there are no more favourable schemes for these employees (Austria and Norway), while in other countries special provision has been made for employees in postal, telegraph, and telephone services (Germany and Italy).

The limitations as to injuries covered are more complicated as they are dependent on the varying definitions of the industrial accident. There are two principal groups of injuries, viz. (*a*) those caused by industrial accidents properly so called, and (*b*) those due to diseases, poisons, and other similar causes.

As has been mentioned in the general report, the definition of the industrial accident properly so called varies chiefly in regard to the question whether an accident, in order to be an industrial accident, must have happened "in the course of the employment" only, *i. e.* while the workman was doing his duty which he was authorised or ordered to perform under the labour contract or otherwise; or "arising out of the employment", *i. e.* when there is apparently a causal connection between the conditions and circumstances under which the work was required to be performed, and the resulting injury. According to the British law, the accident must both happen in the course of, and arise out of, the employment in order to be compensable. The provisions of the British law have served as model for most of the British Dominions and for most of the American states. There are similar provisions also in Denmark where the accident must be "occasioned by the work", in Germany where the accident must be "due to the nature of employment", and in Sweden where the accident must "result from the employment"; In a majority of European countries, notably in Austria, Belgium, Finland, Hungary, Luxemburg, Netherlands, Norway, Switzerland, as well as in six of the American states, the industrial accident must only occur in the course of the employment to be compensable. In other countries again (Italy, Spain, France) the industrial accident must either happen in the course of the employment or arise out of the same.

In regard to the group of industrial accidents properly so called there are still some limitations as to injuries covered by the compensation law. Injuries intentionally inflicted are excluded in most of the European countries and in most of the American states and two of the Canadian provinces. It is to be noted, however, that Hungary compensates for self-infliction if it results in death. In many countries, especially in the United Kingdom and the British Dominions, as well as in 15 American states, accidents attributable to (serious and) wilful misconduct of the workman, are excluded, but in the United Kingdom and four of the Canadian provinces, these accidents are compensable if they have resulted in death or serious disability.

Injuries caused through gross negligence of the injured are excluded in Denmark and in two of the American states, while in France and Sweden the compensation may be reduced on account of such negligence (1). On the contrary, in Austria and Germany and other

(1) In Sweden, moreover, accidents due to gross negligence on the part of the overseer are excluded from compensation law.

countries, this does not exclude from, nor reduce, the compensation. Further, injuries due to intoxication of the employee are excluded in Netherlands (in case of temporary disability, half of the compensation is, however, paid) and in 31 of the American states as well as in two of the Canadian provinces. In Sweden, the compensation is reduced on account of drunkenness. Injuries received in consequence of an illegal act are excluded in Austria, Finland and Luxemburg, as well as partly or totally in Germany. Finally, injuries received on the worker's way to or from work are legally covered only in Austria (since 1922), Belgium, Finland (if the way is dangerous), Germany (in regard to small home traders and farmers insured only), and in Sweden (since 1919).

The other principal group of injuries lack the primary characteristics of an "accident", particularly casualty, suddenness and exteriority, but, on the other hand, they possess the "industrial" character in a high degree. These injuries are (*a*) general diseases caused or aggravated by the occupation, (*b*) occupational diseases and poisons, and (*c*) other "health hazards", *e.* g. abnormalities of temperature. compressed air, damp, dust, extreme light, etc.

This group of injuries is at present excluded from the sphere of the accident compensation law and statistics in the great majority of countries. This has been effected by strict interpretation of the word "accident"; for instance, in Germany, the accident must take p'ace within two hours or at most within a shift of work in order to be considered as a compensable one; while in twenty American laws the exclusion has been effected by special provision in the law. An intermediate position is taken by the Danish law which extends the definition of the industrial accident to "injurious influences" to which a worker may be subject during short periods not exceeding a few days, but excludes the occupational diseases. In France (only since 1919), Switzerland, United Kingdom, in six of the American states (*e. g.* California and Massachusetts), and in the Federal Law of the United States as well as in six of the Canadian provinces, occupational diseases are covered to a greater or lesser extent. In these countries the covering of the most hazardous occupational diseases and poisons, *e. g.* lead and mercurial poisoning, anthrax etc., has partly been effected by special schedules appended to the law (1). On the other hand, these injuries have been brought under the compensation law by interpreting the provisions respecting accidents so that the mishap is treated as an accident if it is attributable to any particular occurrence in the course of employment (United Kingdom), or if the injuries are caused by the employment and traceable to it, or result from, or are aggravated by, the accident (certain American states). Thus, in the United Kingdom and some American states, occupational diseases are considered to constitute an accident in a good many cases where they are in other countries rigidly excluded. The administrative practice varies, of course, widely from jurisdiction to jurisdiction also in this respect.

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(1) The British schedule enumerated in 1906 only six occupational diseases, but includes at present nearly forty.

It may be stated in short that the modern development of the accident compensation insurance shows that increasing groups of injuries tend to be covered.

Apart from the differences resulting from the definition of industrial accident, there is another and, indeed, most important factor restricting the injuries covered, namely, the duration of incapacity for work caused by it. In most countries, an accident to be compensated must cause disability for a certain length of time, no compensation being generally paid during this time. This " waiting period " varies as follows:

No waiting period: Two American states, Spain.
2 days: Finland, Netherlands, Switzerland.
3 days: Sweden (1), the United Kingdom, one American state, the U.S. Federal Government, and two Canadian provinces.
4 days: France.
5 days: Italy.
6 days: Three Canadian provinces.
7 days: Belgium, 25 American states, and two Canadian provinces.
10 days: Norway (3), seven American states (*e.g.* Massachusetts).
13 days: One Canadian province.
2 weeks: Nine American states (2).
4 weeks: Austria (3).
10 weeks: Hungary (3).
13 weeks: Denmark, Germany (3) , Luxemburg (2).

It will be seen already from the above summary statements that the groups of accidents covered by the different statistics are totally different. The bearing of this fact on the comparability of the existing accident statistics will be evident from table X showing simply the numbers of workers covered (full-time, as far as possible) and the numbers of accidents and fatalities covered (compensable, as far as possible), together with frequency rates, in various countries, according to latest data available.

The numbers of (full-time) workers covered seem not to be in direct proportion to the industrial importance of the various countries, but form rather an index of the scope of the legislation and administration as basis of the statistics. The most outstanding feature of the table is, however, the difference in the series of general numbers and rates of accidents covered on the one hand, and of numbers and rates of fatalities covered on the other hand. The frequency of fatal accidents is fairly comparable among the different countries, although there are certain differences in defining even this clear-cut group of accidents as pointed out in the general report. But the frequency of accidents in general does not allow for any comparisons; the rate varies from 2.5

(1) The legal waiting period is 35 days, which is to be applied after the enactment of compulsory sickness insurance law. As, however, this has not yet been done, the employers are provisionally liable to pay compensation after the third day of disability.

(2) In 23 American states the waiting period is abolished entirely if the disability continues longer than certain specified periods.

(3) In these countries accidents are, as a matter of fact, compensated for after the third day after the occurrence of the accident, but since the benefits are paid out of sickness insurance funds, these cases do not come under the accident statistics to which the list principally refers.

TABLE X. — NUMBERS OF INDUSTRIAL ACCIDENTS AND FATALITIES, WITH FREQUENCY RATES, IN VARIOUS COUNTRIES

Country	Year	Number of full-time workers covered	Number of accidents compensated		Accidents per 1000 full-time workers	
			Total	Fatal	Total	Fatal
Austria:						
Former	1911	1,813,553	30,570	1,001	16.86	0.55
Present	1920	596,702	31,568(*b*)	394(*b*)	52.90(*x*)	0.51(*x*)
Belgium	1910	832,127	98,171	510	117.97	0.61
Denmark	1919-20	610,116	7,960	266	13.05(*x*)	0.44(*x*)
Finland	1919	177,559	8,228	146	46.3	0.8
France						
Insurance	1910	3,866,101	17,447	1,738	4.51	0.45(*x*)
Factories and mines	1913	4,839,824(*a*)	626,774 (*b*)	2,607(*b*)	129.50(*x*)	0.54(*x*)
Germany:						
Industries	1920	9,457,797	59,677	6,941	6.31	0.73
Agriculture	1920	16,015,000(*a*)	40,322	2,219	2.52	0.14
Italy	1921	847,845(*a*)	137,487	444	162.16(*x*)	0.52(*x*)
Netherlands	1917	787,388	79,316	264	100.7	0.34
Norway	1918	213,858	12,471	152	58.3	0.71(*x*)
Sweden	1919	1,366,836	54,893	614	40.16	0.45(*x*)
Switzerland	1918	600,000	93,903	247	156.51(*x*)	0.4 (*x*)
United Kingdom	1921	7,315,866(*a*)	283,361	2,385	38.73(*x*)	0.33(*x*)
United States						
Iron and steel	1919	377,549	42,276(*b*)	419(*b*)	111.97(*x*)	1.11(*x*)
Oregon	1919-20	71,166	13,289	133	188.14	1.87(*x*)

(*a*) Average number of workers employed during the year, or insured.
(*b*) Number of reported accidents.
(*x*) Rates calculated by the International Labour Office.

AUSTRIA (Former): Accidents disabling for over 28 days. (Present): Accidents disabling for over 3 days. BELGIUM: Accidents disabling for over 7 days. DENMARK: All employments covered. Accidents approved compensable, disabling for over 13 weeks. FINLAND: Accidents disabling for over 2 days. FRANCE: Insurance statistics: "Grave accidents", *i. e.* fatal and permanent disability; Factory and mining accidents: Reportable accidents disabling for at least 4 days. GERMANY: Accidents disabling for over 13 weeks. In agriculture: number of workers insured. Total number of accidents reported (disabling for over 3 days) in 1920: 591,922 (understood to be too low). ITALY: (Agriculture excluded). Accidents disabling for over 5 days. NETHERLANDS: Accidents disabling for over 2 days. NORWAY: Industries only covered. Accidents disabling for over 10 days. SWEDEN: All employments covered. Accidents disabling for over 3 days. SWITZERLAND: Industrial accidents disabling for over 2 days. UNITED KINGDOM: Seven employments, liable to report. Accidents disabling for at least 1 week. UNITED STATES: Iron and Steel: "Tabulatable" accidents, disabling for more than 1 day or shift. OREGON: Accidents, closed cases. No waiting period. — It has been estimated that there were, in the United States as a whole, 37,960,000 salary and wage earners and 23,055 fatal accidents in 1913, which gives the fatality rate of 0.64 (Mr. Hoffmann, *Bulletin of the United States Bureau of Labour Statistics*, No. 157), and the total number of accidents disabling for one day or more has been estimated at 3,255,800 (Mr. Fisher, *Ibid.*, No. 212), which gives as general frequency rate 85.77.

to 188.1, to take the extremities, or from 6.3 to 162.2, to consider two cases where the covering of employments is about the same (statistics of accidents in industry, Germany and Italy). These enormous differences are not due to legislation alone, but also to the different statistical methods employed in the various countries. As regards particularly the different meanings of "compensable" accidents, the following selected instances will prove illustrative.

In Austria, there were 484,755 reported accidents in the five-year period 1902 to 1906. Only 138,640, or 28.6 per cent., of them were compensable under the accident insurance system, *i.e.* those which disabled the victim for more than four weeks. The medical treatment of these compensated accidents ended at the subsequent weeks in the following proportion:

Disability cured	*Percentage of compensated accidents*
In the 5th week	17.7
» 6th »	16.1
» 7th »	11.7
» 8th »	8.9
» 9th »	7.2
» 10th »	5.4
» 11th »	4.2
» 12th »	3.4
» 13th »	2.9
» 14th » and later	22.5
	100.0

In Belgium, 35.7 per cent. of the total number of reported accidents (138,255) in 1906 were non-compensable accidents, *i.e.* such as to involve disability for less than eight days. Moreover, almost one-half (48.6 per cent.) of these non-compensable accidents were cured within less than three days. In 1910, 96.8 per cent. of the total of compensable accidents (198,171) involved temporary disability only. The duration of disability was for these accidents proportionally as follows:

Duration of disability	*Percentage of compensated temporary disability cases*
8 to 28 days	87.0
29 to 42 »	7.4
43 to 92 »	4.5
93 to 180 »	0.8
6 months and more	0.3
	100.0

In Sweden in 1918, of the total number (49,834) of all reported accidents about 16 per cent. were cured within three days. Of accidents causing temporary disability for more than three days and insured also for the waiting period (32,676 in all), 98.5 per cent. remained disabled on the seventh day after the accident, 72.3 per cent. on the eighteenth day, 44.4 on the twenty-third day, 30.8 per cent. on the thirtieth day, and 21.8 per cent. on the thirty-sixth day; and only 4.2 per cent. in the fourteenth week after the accident.

These examples show clearly how important are the differences between the definitions of the compensable accidents, and especially in the waiting periods. Thus it appears that, if the Austrian accident statistics be compared, *e.g.*, with the Belgian ones, it is necessary to reduce the number of compensable accidents in Belgium by about 87 per cent. in order to base both statistics upon accidents that disable for more than four weeks (1). Or, if the Swedish statistics be compared with the German ones, only about 10 per cent. of accidents covered in the former statistics

(1) If this is applied to table X above, the Belgian accident rate would be reduced to 15.4, while the Austrian rate is 16.9.

(*i.e.* 4.2 per cent. of cases of temporary disability, plus permanent disability and fatal cases) can be taken into consideration in order to base both statistics upon accidents disabling for more than 13 weeks (1).

It is evident that at present no comparisons can be established even between the general numbers and frequency of industrial accidents in the various countries.

Differences in the Reporting

Only a minority of existing accident statistics cover, beside accidents compensated, accidents reported but not compensated. The groups of accidents brought under the group of reported accidents vary considerably from country to country. The provisions and practices respecting the reporting of accidents differ in three points, viz.:

(1) which employers are required to report;
(2) which accidents are required to be reported; and
(3) within which time the reporting is to be made.

The rule is generally that only employers under the compensation law are required to report. In some countries, however, all employers have to report, *e.g.* in Finland, France, Italy, and Netherlands, as well as in several of the American states (*e. g.* Massachusetts). In the United Kingdom, only employers in seven specified employments (including factories, workshops, and mines) are required to report.

All accidents, however trivial, are required to be reported in some of the American states (*e.g.* in Massachusetts). In a few countries all disabling accidents are to be reported (*e.g.* in France, Spain, Netherlands, and in many American states, *e.g.* California and Oregon). Accidents involving disability for more than two days are to be reported in Finland and Switzerland, for more than three days' disability in Austria, Germany, Norway, Sweden, and United Kingdom, for more than five days in Italy, for more than one week in Belgium and, finally, those assumed to disable for more than thirteen weeks in Denmark. These large differences are connected with those in the waiting periods for compensation, mentioned above.

The third point, the time within which the accidents are required to be reported, affects little the scope of the accident statistics, but is of great importance in regard to the accuracy and completeness of the statistics. In some countries the reporting is to be made "immediately" (Finland, Sweden) or "as soon as practicable" (United Kingdom), while the time allowed for reporting is prescribed in the law in most countries, and varies from 24 hours (Spain), 48 hours (France, Netherlands) to ten days (Austria).

According to common experience, the reporting of accidents is made with very varying care and accuracy by various employers even within

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(1) If applied to table X the Swedish accident rate would be 4.0 covering all employments, while the German rate for industry is 6.3, and that for agriculture 2.5.

one country and one industry. It may perhaps be assumed that accidents are carefully reported only when the reporting is connected with the practical interests of the employers and workers. The Swedish accident statistics for 1918 mention an interesting instance of this point. The compulsory accident insurance covers only accidents disabling for more than 35 days, but insurance for the waiting period is voluntary. It now has appeared that of the injured workmen coming under the compulsory insurance scheme only, 29.5 per cent. were still disabled on the thirty-sixth day after the day of the accident, while only 21.8 per cent. of the injured workmen insured also for the waiting period were similarly disabled. This is concluded to be due to the fact that slighter accidents are reported more carefully in the case where their victims are insured also for the waiting period. This indicates that the statistics of reported accidents are bound to be less reliable and perfect than those of compensated accidents. The collection of data regarding the former group of accidents is largely dependent on the interest of the reporters and on the authority and effectiveness of the administrative bodies responsible for the collection. The compensable accidents are generally recorded and inquired into with great care and accuracy, since considerable economic insterests are involved.

APPENDIX II

STANDARD CLASSIFICATIONS

A. Standard Industry Classification. International Joint Committee (European).

I. Agriculture and forestry.
II. Food industry (mills, beverage, foodstuff and tobacco industry).
III. Mining.
IV. Metal industry.
V. Stone and earthenware industry (quarrying, firestone).
VI. Building, public works, theatres.
VII. Timber industry and toy-trade.
VIII. Chemical industry, water, gas, and electricity works.
IX. Textile industry, cleaning, and leather industry.
X. Paper and polygraphic industries.
XI. Transportation:
    Railways and tramways.
    Other transportation by land and warehousing.
    Post and telegraph.
    Inland navigation.
    Shipping.
XII. Wholesale and retail trade, banks.
XIII. Army and Navy.

B. Standard Industry Classification. American Committee [1]

I. *Agriculture.*
    1. Agriculture.
II. *Mining, Metallurgy, and Quarrying.*
    2. Mining.
    3. Metallurgy.
    4. Quarries and stone-crushing.
III. *Other Extractive Industries.*
    5. Forestry.
    6. Fishery.

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[1] The Committee on Statistics and Compensation Insurance Cost of the International Association of Industrial Accident Boards and Commissions (of the United States and Canada).

IV. *Manufacturing.*

7. Food.
8. Textiles.
9. Clothing.
10. Laundries, cleaning, and dyeing.
11. Leather.
12. Rubber and composition goods.
13. Paper and pulp manufacturing.
14. Paper goods.
15. Printing.
16. Wood products.
17. Blast furnaces, steel works, and rolling mills.
18. Metal goods.
19. Machinery (not forging or woodwork).
20. Fine machines and instruments.
21. Vehicles.
22. Stone products.
23. Clay products.
24. Glass products.
25. Chemicals.

V. *Construction.*

26. Construction (not building erecting).
27. Building erection and demolition (occupational classification).
28. Shipbuilding.

VI. *Transportation and Public Utilities.*

29. Water transportation.
30. Steam and electric railroads.
31. Cartage and tracking.
32. Utilities.

VII. *Trade.*

33. Commercial.

VIII. *Clerical and Professional Service.*

34. Clerical and professional employments.
35. Care and custody of building and grounds.
36. Miscellaneous occupations (domestic service, policemen, firemen, etc.).

C. Standard Classification of Causes. International Joint Committee (European).

1. Machinery:
   (*a*) Prime movers.
   (*b*) Transmissions.
   (*c*) Working machinery.
2. Hoisting apparatus, cranes.
3. Steam boilers, steam pressure (explosions).
4. Explosive substances.
5. Hot and corrosive substances.
6. Rupture, collapse, and fall of objects.
7. Falls from elevations.
8. Loading and unloading by hand.
9. Vehicles and animals.

10. Metalled roads.
11. Navigation.
12. Hand tools (including flying chips and splinters).
13. Miscellaneous.

D. Standard Classification of Causes. American Committee.

I. *Machinery.*

A. Prime movers.
B. Power transmission apparatus.
C. Power working machinery.

030. Stone, clay, and glass product machines.
100. Metal working machines.
200. Wood working machines.
300. Leather working machines.

300. Tanneries.
320. Leather products.

360. Paper making machines.
386. Paper product machines.
420. Printing and bookbinding machines.
460. Textile machines.
560. Laundry machines.
580. Food product machines.
670. Farm machines.
680. Engineering and contracting machines.
690. Chemical product machines.

690. Acids and salts.
700. Soaps, greases, oils, and fertilisers.
705. Drugs.

710. Paints, varnishes, dry colours, inks, and dyes.
720. Rubber, celluloid, composition, pearl, bone, and tortoise-shell.
735. Mining and ore-refining machines.
745. Miscellaneous.

II. *Vehicles* (not including construction of).

A. Cars and engines — steam and electric railways.

1. Train wrecks.
2. Falls from or in.
3. Struck by or caught between.
4. Other causes.

B. Mine and quarry cars and motors.
C. Plant, trucks on tracks.
D. Automobiles and other power vehicles.
E. Bicycles.
F. Aeroplanes.
G. Animal drawn vehicles (not mine or quarry cars).
H. Animal drawn implements (not machinery).
I. Water craft.
J. All other vehicles.

III. *Explosives, Electricity, Fires, and Hot Substances.*

A. Boilers and steam pressure apparatus.
B. Explosions of explosive substances.
C. Other explosions.
D. Electricity.
E. Conflagrations.
F. Hot substances and flames.

IV. *Poisonous and Corrosive Substances, and Occupational Diseases.*

V. *Falls of Persons.*

(*a*) From elevations.
(*b*) Into excavations, pits, and shafts.
(*c*) On level.

VI. *Stepping on or Striking against Objects.*

A. Stepping on objects.
B. Striking against objects.

VII. *Falling Objects — not being handled by Injured.*

A. Collapse of.
B. From elevations.
C. Trees.
D. Objects tipping over (except vehicles).
E. Into excavations.
F. Cave-ins (not mines or quarries).
G. In tunnels.
H. In mines or quarries — inside.

VIII. *Handling of Objects.*

A. Heavy objects.
B. Sharp or rough objects.
C. Hand trucks, carts, and wheelbarrows.

IX. *Hand Tools.*

A. In hands of injured worker.
B. In hands of fellow worker.

X. *Animals.*

A. Draft animals.
B. Other animals.

XI. *Miscellaneous Causes.*

CLASSIFICATION OF MACHINERY ACCIDENTS BY MANNER OF OCCURRENCE

Manner of Occurrence, Machine Accidents.

1. Adjusting machine, tool, or work.
2. Starting, stopping, or operating machine.
3. Cleaning or oiling machine.
4. Repairing machine.
5. Breaking of machine or work.
6. Flying objects, striking operator.
7. Flying objects, striking person other than operator.
8. All other.

Classification of Machinery Accidents by Part of Machine

Part of Machine on which Accident occurred.

1. Point of operation.

   Note. — Point of operation means that part of machine at which work is actually inserted and maintained during any process of forming, cutting, shaping, or other operation.

2. Belts.

   Note. — Accidents upon belts, pulleys, shafts, gears, or other driving mechanism or parts thereof which form the connection between a machine and the prime mover or intermediate drive, shall be charged to transmission apparatus. This includes parts attached to the machine. Accidents upon belts, pulleys, shafts, gears, or other driving mechanism, or parts thereof, which connect one part of the machine with another part of the same machine, shall be charged to the machine.

3. Cranks or eccentrics.
4. Flywheels.
5. Gears.
6. Set screws, keys, and bolts.
7. Counterweights.

General note. — The classification of part of machine and manner of occurrence applies as well to prime movers and hoisting or conveying machinery as to working machines.

E. Classification by Location and Nature of Injury. International Joint Committee (European).

1. Head and face, except eyes.
2. Eyes.
3. Arms and hands.
4. Fingers.
5. Legs and feet.
6. Other and multiple locations.
7. Internal injuries.
8. Asphyxiation.
9. Drowning.
10. Miscellaneous.

F. Classification of Location of Injury. American Committee.

A. *Head.*

1. Brain.
2. Eye.
3. Both eyes.
4. Internal ear.
5. Both internal ears.
6. External ear.
7. Skull.
8. Scalp.
9. Head (not otherwise classified).

B. *Face and Neck.*

1. Forehead.
2. Eyelids.
3. Nose.
4. Cheek.
5. Upper jaw.
6. Lower jaw.
7. Teeth.
8. Tongue.
9. Lips and chin.
10. Face (not otherwise classified).
11. Neck.

C. *Trunk.*

1. Spinal cord.
2. Vertebrae.
3. Back (external).
4. Sternum.
5. Ribs.
6. Thorax (generally), external.
7. Thoracic organs, internal.
8. Abdomen, external.
9. Abdominal viscera.
10. Groin.
11. Sacrum or coccyx.
12. Pelvis (not otherwise classified).
13. Anus, rectum, or perineum.
14. External generative organs.
15. Hernia, umbilical.
16. Hernia, inguinal.
17. Hernia, other.

D. *Upper Extremities.*

1. Scapula.
2. Clavicle.
3. Shoulder joint.

Note: Use this number only for dislocations of shoulder or fractures of head of humerus.

4. Humerus.
5. Upper arm.
6. Elbow.
7. Radius.
8. Ulna.
9. Radius and ulna.
10. Forearm.
11. Wrist.
12. Arm, general.
13. Both arms or one arm and one hand.
14. Arm and leg.
15. Hand, general.
16. Both hands.
17. Hand and foot.
18. Palm.
19. Back of hand.

20. One metacarpal.
21. Two or more metacarpals.
22. Thumb, one phalange.
23. Thumb. more than one phalange.
24. Index finger, one phalange.
25. Index finger, more then one phalange.
26. Middle finger, one phalange.
27. Middle finger, more than one phalange.
28. Ring finger, one phalange.
29. Ring finger, more than one phalange.
30. Little finger, one phalange.
31. Little finger, more than one phalange.
32. Thumb and one finger.
33. Thumb and two or more fingers.
34. Two fingers.
35. Three fingers.
36. Four fingers.

E. *Lower Extremities.*

1. Hip joint.

   Note: Use this number only for dislocations of hip or fractures of head of femur.

2. Femur.
3. Upper leg.
4. Patella.
5. Knee, other than patella.
6. Tibia.
7. Fibula.
8. Tibia and fibula.
9. Lower leg.
10. Both legs or one leg and one foot.
11. Ankle.
12. Metatarsals.
13. Foot.
14. Both feet.
15. Great toe, one phalange.
16. Great toe, more than one phalange.
17. Lesser toe, one phalange.
18. Lesser toe, more than one phalange.
19. Great toe and lesser toe or toes.
20. Two or more lesser toes.

G. Standard Classification by Nature of Injury. American Committee.

1. Bruises, contusions, and abrasions.
2. Burns and scalds.
3. Concussions.
4. Cuts and lacerations.
5. Punctures.
6. Amputations, traumatic.
7. Dislocations.
8. Fractures.
9. Sprains and strains.
10. Asphyxiation.

11. Drowning.
12. All other.

Note: In case of infection, nature of injury should be correlated with the infection. This is especially important in cases of bruises, contusions, and abrasions; burns and scalds; and cuts and lacerations.

H. Scale of Severity Weights, proposed by the American Committee.

Nature of injury	Degree of disability in per cent. of permanent total disability	Days lost
Death	100	6,000
Permanent total disability	100	6,000
Arm above elbow, dismemberment	75	4,500
Arm at or below elbow, dismemberment	60	3,600
Hand, dismemberment	50	3,000
Thumb, any permanent disability of	10	600
Any one finger, any permanent disability of	5	300
Two fingers, do.	12 1/2	750
Three fingers, do.	20	1,200
Four fingers, do.	30	1,800
Thumb and one finger, do.	20	1,200
Thumb and two fingers, do.	25	1,500
Thumb and three fingers, do.	33 1/3	2,000
Thumb and four fingers, do.	40	2,400
Leg above knee, dismemberment	75	4,500
Leg at or below knee, dismemberment	50	3,000
Foot, dismemberment	40	2,400
Great toe, or any two or more toes, any permanent disability of	5	300
One toe, other than great toe, any permanent disability of	0	—
One eye, loss of sight	30	1,800
Both eyes, loss of sight	100	6,000
One ear, loss of hearing	10	600
Both ears, do.	50	3,000

UTL AT DOWNSVIEW
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